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Advanced Management

COMBINED WITH MODERN MANAGEMENT

IN THIS ISSUE

Annual Conference Special Issue

- *Modern Organization Theories*
- *Getting Results Through People*
- *Incentive Management and Profit Sharing*
- *Understanding and Using Manpower Budgets*
- *Effective Techniques for Transfer Machines*
- *Productivity and Taxes*
- *Time Study Research*

OCTOBER 1950

"M" — Management

(Men, Methods, Materials)

MEN ARE THE KEY factor in the utilization of methods and materials to bring about maximum effectiveness in production.

Scientific management coupled with industrial engineering has brought the production functions of American industry to a high plane. However, many companies have not realized all of the benefits available through the proper application of these techniques.

Outdated tools on the production floor make themselves felt in the form of high costs and an untenable competitive position. Inadequate management tools can nullify the advantages gained from the employment of technological improvements. The management of a successful business finds it imperative to direct continuous attention to the application of improved control techniques as well as the application of technical advances.

Methods analysis can find the one best way to do the job in the particular situation; *time study* can establish standard times for each operation; *production controls* can order productive operations and assure more and continuing productivity; *quality controls* can insure a satisfactory final product; and *cost controls* form the basis for the maintenance of low manufacturing costs. The effective application of sound engineering and management principles in these activities will result in lower costs and greater earnings.

Loose control over assets is costly. In many instances cash is closely controlled while material is not. Management generally devotes much effort to the control of cash, an asset which is relatively easy to control and in the handling of which the chance of loss is slight. Most manufacturing companies maintain an inventory which represents several times the value of their cash. However, relatively little effort is devoted to the control of this cash investment in an asset which is difficult to control and where losses can be great and remain undiscovered for long periods.

Real savings are possible through effective procurement. However, these savings cannot be realized without effective materials control. The use of the correct methods and techniques for the proper control of inventories will minimize material losses and make possible savings through effective procurement.

SCIENTIFIC MANAGEMENT as applied to methods and materials implies effective Human Relations. Our technological advances have been made in many cases at the expense of employee relations. This has led to a change in the prevailing concepts of early days. The worker formerly felt much more indebted to the employer for the opportunity to work than he feels today. Men formerly "lived to work" where too often today, men "work to live."

There is a growing realization that the situation must be changed before we can make any further significant technological progress. A method alone will produce nothing. Men must will to make it work or the methods will be useless.

If we are to solve our Human Relations problems, we must recognize and observe certain principles which apply in their solution. First we must recognize that *Human Relations is a science.* It is not an exact science, but a science nevertheless. For many years we have used rule of thumb, haphazard methods, and guess work. The time has now come when, if we are going to solve our Human Relations problems, we must use logical and scientific methods of approach, as we do in the solution of any other managerial problem.

Second, *we must find ways and means of restoring the dignity of man* at each work station.

Third, *we must find ways and means of bringing back values to our living.* Today ours is a psychology of forgetting and that must be replaced with a psychology of remembering. "Give away" programs and similar devices have created in the minds of many the "something for nothing" philosophy and the "why work?" philosophy, which as we all know, is very unsound. The only way we can ever increase profit and pay higher wages, is through increased productivity. This same line of thinking carries into the field of happiness because it is only through service to others that we ever attain the goal of real, true, great happiness. On the implementation of these principles, and with full consideration of the underlying philosophy, rests the future of our technological attainments. Sound Human Relations are indispensable not only to productivity but to the preservation of the values of our American way of life.

DILLARD E. BIRD

Volume XV No. 10

October, 1950

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Advanced Management

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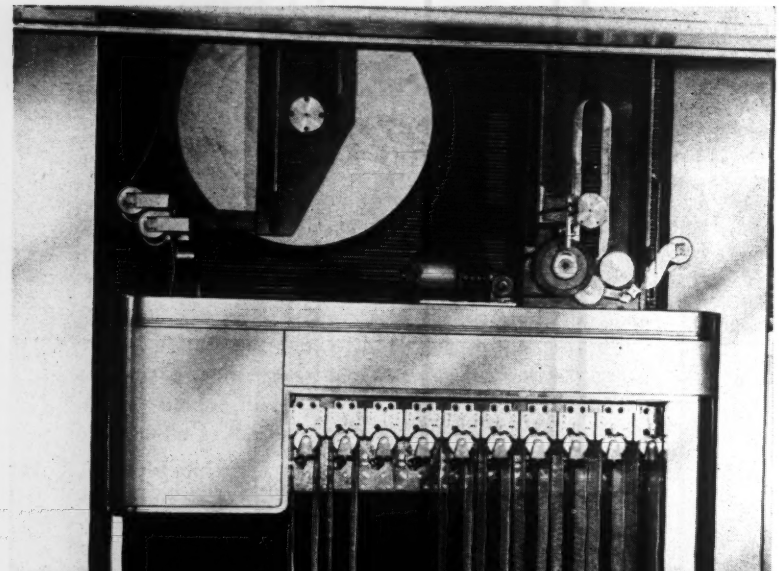
Photograph Credits: pages 2 and 3, International Business Machines; pages 8 and 9, International Harvester; pages 15 and 17, Air Reduction Company.

ADVANCED MANAGEMENT, published monthly by Society for Advancement of Management, 84 William Street, New York 7, N. Y., is merged with MODERN MANAGEMENT, and is successor to The Society for the Advancement of Management Journal, the Bulletin of the Taylor Society and of The Society of Industrial Engineers. Re-entered as second-class matter, December 23, 1949, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Copyright, 1950, Society for Advancement of Management.
Subscription rate: $8.00 per year. Single copies: 75 cents (members); $1.00 (non-members). An index to ADVANCED MANAGEMENT is published annually, and the contents are also indexed in *Industrial Arts Index* which is available at Public Libraries. Notification of address changes must be given four weeks in advance.



". . . exhibiting many of the simpler characteristics of the human brain." A "memory unit" of the Selective Sequence Electronic Calculator.

Modern Organization Theories

By HERBERT A. SIMON

Head, Department of Industrial Management,
Carnegie Institute of Technology

Today's theories outline tomorrow's practices. A review of recent developments by pioneering researchers.

MANAGEMENT IS ONE of the few remaining fields where the delusion is still widely prevalent that there is something called "good theory" and something quite different called "good practice." It is almost the only field of human endeavor today where a man prides himself on being "practical" and not a "theorist." This delusion is based, of course, on a misapprehension of the meaning of theory. Good theory is theory that works. A theory that does not work as it says it works, that does not explain what it says it explains, that does not predict what it says it predicts, may be good witchcraft or good magic; but it certainly is not good theory.

Fortunately, this attitude is changing, and changing rapidly. The successes of theory in engineering—particularly the drama of radio that began with *Clerk Maxwell's* hopelessly theoretical electromatic waves; and the *Buck Rogerish* climax of atomic physics—have convinced even the man on the street that today's improbable imaginings of the theorist may be tomorrow's realities.

Up to the present, theory cannot point to any equally impressive triumphs in the field of management (or even in the larger area of the social sciences), but important beginnings have been made in the past two decades. One area in which the foundations are being laid is well known to most readers of this journal—the social psychology of management. The *Hawthorne Experiments* carried out in the *Western Electric Company* were the forerunners of an ever-growing activity of empirical research into the behavior of people in organizations.

In this article I should like to call attention to another area of even more recent development. I must warn the reader at the outset that there is very little concrete evidence as yet that this work will have practical results. If it is pursued, it is with the belief that the social sciences need some of the spectacular flights of unfettered fancy that have proved so fruitful in the natural sciences. It is not an area for those who, in their impractical urge to be thought practical, forbid themselves to start out on untried paths whose destinations are not known.

The area that I wish to describe has already received some popular attention through the publication of books by two eminent mathematicians and an economist. The first of these is *THE THEORY OF GAMES AND ECONOMIC BEHAVIOR* by *John Von Neumann* and *Oskar Morgenstern;* the second is *CYBERNETICS* by *Norbert Wiener.* Since both works are highly mathematical, the amount of public interest they evoked must have been a source of some surprise both to their authors and their publishers.

THE THEORY OF GAMES

A theory of poker, which is the best-developed of *von Neumann's* theory,

may appear to you intensely practical but quite distant from administration. Not so. *Von Neumann* has shown that the ordinary definition of human rationality as some kind of maximizing behavior breaks down as soon as one is confronted with a situation where two or more persons are each trying to achieve partially conflicting goals. Clearly most, if not all, administrative situations are of this kind, and *von Neumann's* definition of a criterion of rationality to fit such circumstances has direct application. One of the most obvious applications of the theory is to military strategy; another is to the behavior of monopolists and oligopolists; a third is to the study of the conditions necessary to the survival of organizations; a fourth is to the study of efficient methods of dividing work in organizations. Active research is going on today in all these directions. The reader who wishes a non-technical introduction to the theory of games and some indication of its implications and possible applications will find these in an article published in the June 1950 issue of *Fortune Magazine.**

SERVOMECHANISMS

Wiener's CYBERNETICS is sub-titled *"Control and Communication in the Animal and the Machine"*. The work is based on some striking analogies that exist between the functioning of the electro-mechanical systems known as "servomechanisms" and the functioning of living organisms. A servomechanism is a device that controls the operation of a machine, perceives the amount of error in its control, and acts to correct the error. Simple examples of servomechanisms are a house thermostat for controlling temperature, and a governor for controlling the speed of a machine. A more modern example is a radar gun-pointing mechanism. We may say that a servomechanism is a machine that has a purpose (for example, keeping the house at a comfortable temperature), and which strives to accomplish that purpose (by turning on the furnace when it is cool, and turning it off when it is warm). If it were alive, we would say that it exhibited rationality and intelligence.

It is easy to find organizational analogues of servomechanisms. We might, for example, describe an inventory control system as a system that strives to maintain inventories at a proper level by placing new orders when the stock is too low. The order point is the thermostat setting. The importance of the discovery of this analogy is that powerful mathematical tools have already been developed for the analysis and design of electrical and mechanical servomechanisms. These tools now become available for the study of organizational and other social and human servos. Again, a small number of persons is actively engaged in research on these problems today.

HIGH-SPEED COMPUTERS

One of the important uses for servomechanisms is in the construction of "electrical brains"—high speed computing machines. This has a three-fold implication for organization theory. In the first place, the computing machines themselves will soon have numerous organizational applications, in some cases replacing large numbers of human computers. In the second place, the computing machine is in fact a "brain", exhibiting many of the simpler characteristics of the human brain. There are already strong indications that the computing machine will in time make important contributions to neurology and psychiatry—its neuroses, so to speak, will give new insight into human neuroses. (For an excellent non-mathematical introduction to computers, see Edmund C. Berkeley, *Giant Brains.*)

COMMUNICATION THEORY

One person whose work has been influenced by these developments is *Professor Alex Bavelas* at M. I. T. He is carrying theoretical work and experimentation hand-in-hand toward the construction of a theory of organization communication. In his theory he is making use of the tools of mathematical topology—applied long ago to electrical

"The application of linear programming theory to these familiar devices may bring about important advances". Printer, connected to calculator, allows scientist to follow progress and modify program in light of results.

**This article has been expanded into a book,* STRATEGY IN POKER, BUSINESS AND WAR, by John McDonald.

networks. In his experimentation he has devised means for constructing artificial communication systems that permit only certain persons in an experimental group to communicate with each other, and only through certain channels. By changing the communication network, he is able to study the effects of the communication system upon the performance of tasks that are given to the group.

LINEAR PROGRAMMING

The availability of computing machines has stimulated interest among social scientists in the possibility of solving large systems of simultaneous equations that are descriptive of complicated economic and social systems. This has led to a great deal of activity in what is now known as "linear programming theory" — a mathematical theory for the programming of interdependent activities.

As an example of the types of problems to which linear programming is applicable, I may mention the warehouse problem proposed by *A. Cahn.* An entrepreneur undertakes to operate a warehouse of fixed capacity by filling it with goods for which there is a seasonal production and consequently a seasonal price. Each month new goods become available and the owner must make a decision as to the disposal or continued storage of his present holdings and as to the purchase of goods that have just become available to use up his idle capacity.

It is already known that the bill of materials, frequently used in production control, is essentially a rudimentary linear programming device, as is, indeed, the common form of continuous inventory control, and the ordinary double-entry accounting system. The application of linear programming theory to these familiar devices may bring about important advances in the paperwork side of management. Little published material is available at present on linear programming, but a volume on the subject is to be published shortly by the *Cowles Commission for Research in Economics.*

And now we have completed the circle from theory of games, servomechanism theory, communication theory, computing theory, to linear programming theory and back to the theory of games. For within the past two years it has been proved that linear programming theory is mathematically equivalent to a part of the theory of games. (Since coincidences of this sort abound in mathematics, it is perhaps not surprising, although highly gratifying, that the statistical theory underlying modern methods of quality control also turns out to be a special case of the theory of games.)

THE PROSPECT

In describing these developments, which are now engaging the efforts of a very considerable group of scientists in a dozen locations, I do not wish to create undue anxiety in the minds of executives about their prospective obsolescence. Before today's business executive and management engineer take their place with the mastodons, quite a span of years if not generations, is likely to elapse. Nevertheless, I think it is fair to regard these researches—along with the social-psychological researches mentioned earlier—as portents that we are in time going to have theory in management—theory of the kind that predicts reality, and not the kind that is contrasted with practice. When that time comes, managers will be those who can handle and apply that theory.

The Society for the Advancement of Management had its birth in the efforts of *Frederick Taylor* and his followers to apply the methods of science to the field of management. If the spirit of scientific adventure still persists in the Society, its members will wish to take an active part in the important research developments now taking shape.

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Getting Results Through People

By THOMAS G. SPATES

Vice President, Personnel Administration,[1]
General Foods Corporation

Practical re-emphasis on basic principles of sound and effective personnel policy. Four illustrative case histories provide thought provoking background.

THE PRIMARY PROBLEM facing us in government, education, and industry is LEADERSHIP — improving the quality of leadership rather than changing radically the system under which this leadership operates. I think it is not unrealistic to say that we have been witnessing, for entirely too long a time, abuse of power, and we are in many of the difficulties we are in today because of that abuse of power. Therefore, when I put the emphasis on improving leadership, I mean just this:

We should do more about developing leaders who know how to use their power for their own and the common good.

By improving our leadership, we are bound to get a restoration of confidence — and it is confidence which we lost as a result of the depression beginning in the early thirties. This great yen for "security" on the part of everybody at somebody else's expense has its origin in the lack of confidence, or the destruction of confidence, which was generated as a result of this long and deep depression.

When I talk about leadership, I am talking about courses of education and training which will give to our present and prospective leaders the know-how and the ways in which they may conduct themselves in relationship to the people whom they direct, so that they will establish a feeling of confidence and a reputation for good leadership for which we have such a tremendous need.

RESPONSIBILITIES OF LEADERSHIP

The standard of leadership in industry and business is one that accepts a sense of social responsibility. I think it is valid to generalize to this extent with respect to business and industrial leadership today:—There are leaders who still proclaim — (very seldom publicly) — that they are in business for the sole purpose of making a profit. By contrast, we have a group of leaders who are inclined to say—publicly—that they are in business not solely for the purpose of making a profit, but because of a responsibility to conduct the business in the best interest of owners, customers, and employees.

That is what I mean by an acceptance of social responsibility. I mean a sense of responsibility that does not wait for an arbitration board or a fact-finding commission to persuade a company or an industry that it should voluntarily make some provision for the old age of its employees. I am talking about an industrial and business leadership that has a set of principles of personnel administration that it is willing to reduce to writing and make available to all.

I might add, somewhat parenthetically, that during my two years as a member of a personnel advisory council to the armed forces, I was one of the advocates of a published, reduced-to-writing policy for the Department of the Army. When I looked back to my service as a private and a Second Lieutenant in World War I and the experiences I had had in the United States and overseas, I was forced to the conclusion then that the personnel policy of the Army was "treat them rough and tell them nothing." That conclusion came out of the experiences I had had.

In the absence of a reduced-to-writing personnel policy, those on the payroll of either Government or business have to find out the hard way, what the personnel policy is. I understand there is now a personnel policy for civilian employees of the Department of Defense, and I am encouraged to believe that some day there may be one having to do with military personnel.

BASIC PRINCIPLES

To be more specific, here are *six specifications of sound organization which should be a part of any personnel policy*:

1. The purpose of the organization and each part thereof should be clearly defined and explained.
2. Every position in the organization should be described in writing.
3. Each unit of the organization, and the supervisor thereof, should be confined to the performance of a single leading function.
4. The span of control of everyone who directs the work of others should be kept within practical limits.
5. Responsibility should always be coupled with corresponding authority.
6. A clear and well-understood line of authority should run from the top to the bottom of every organization.

In my experiences with the armed forces, these are the policies I have seen and experienced as being most commonly violated. I have seen organization charts which raised many more questions than they answered. The most common characteristic of them is dotted lines. You always have to ask, "What

Adapted from a paper presented at the 4th Annual Conference of the Training Within Industry Foundation.

[1]Now Professor of Industrial Administration at Yale University.

do the dotted lines mean?" I have yet to find an unequivocal, straightforward answer.

These six specifications are the generally accepted standard against which to test the soundness of organization concepts and structure. You can be absolutely sure of trouble and reduced productivity and morale when they are violated — that I will guarantee.

CONSULTATION AND EXPLANATION

Those who have directed the work of others and have practiced consultation and explanation, know the tremendous satisfactions that come from seeing results in terms of the spirit that people put behind the performance of an assigned task.

If you have ever been engaged in the function of personnel administration, in business or otherwise, you know how very difficult it is to get across to the highest levels the fact that good personnel administration can produce tangible results. Therefore I am trying to present, in the arguments that I use for improved personnel administration, evidence and support for this idea.

Right out of the file — and I don't mean the textbook — I have some case histories. The first one is from Ontario, Canada. It is a letter, dated January 17, 1949, from the union committee to the manager of a plant, which says, among other things:

"So at this time, with the markets leveling off, we are making no wage claims and we feel sure that should our optimisms regarding prices be unfounded, you will, as in past years, be ready to discuss it with us. That covers all we have in mind at this time, and we trust that our negotiations will be carried through in the same spirit of harmony and good will that has prevailed in all of our previous meetings."

Against a background of the things I have outlined for you in terms of leadership and social responsibility in industrial and human relations, those are the results that can be achieved. *They are tremendously significant in the light of what we are seeing almost daily on the front pages of our newspapers.*

You may say, "That was a cinch. You had no problem because the union took the initiative in making it easy for you."

COMMUNICATION AND INFORMATION

Very well, — let's look at another. It is dated October 13, 1949. As against the one before, which had no demands, it lists 22 demands made to the management of one of our operations by a union which is supposed to be "tough." These demands are for the union shop, a general wage increase of 18 cents, three weeks' vacation for 15 years' service, payment by the company of half of the cost of the hospitalization plan, and assumption of the full cost of both the insurance plan and a pension plan which costs two and a half million dollars a year, etc., etc.

We will say it is a relatively "tough" union, as the terminology goes, and they "mean it." Again, against the background that I have reviewed for you,— a background of years of painstaking effort to do some of the things that I am talking about, you find yourself in the presence of a union committee that says, "We are very serious about these 22 demands." Well, what do you do about that?

You prepare a lot of charts. This is a process of communication and information, and in these charts you find, generally, *the economics of this particular business.* These employees and their representatives are taken into the confidence of management in terms of the problems that management is up against *and the problems that they, too, are up against in the economics of this situation.*

THE UNFORTUNATE THING IS THAT THIS RELATIVELY SIMPLE PROCEDURE IS ALSO RELATIVELY RARE.

What were the results? The union committee withdrew all its demands except a minor administrative one, and the contract was signed. The president of the union local, who is one of our employees, published in the newspapers, in the face of what might have been considered a disastrous defeat for the union, the following statement:

"The union is sincere in its belief that, if the kind of attitudes and the degree of mutual respect existing between management and the union at . . . existed generally, there would be a much healthier labor situation throughout the Nation than now prevails."

As a result of some of our own studies and studies made by other companies, we came to the conclusion that 80 percent of the things that go wrong *are due to people;* — not acts of God, for example. *People who either don't know, can't do, or don't care.* Training is the only known medium whereby you can fill those gaps.

EFFECTIVE TRAINING

In our company, there is a major problem of accidents. It is a human and an economic problem. In 1945, the accident frequency rate in our corporation, across the country, was 22. Knowing from other experiences the power of training, we applied it to the problem of *accident prevention.* We wound up in 1949 with an accident frequency rate of 6, as compared with 22 in 1945, *even though in that time the exposure had been increased by 48 percent.*

Those frequency rates are reflected in workmen's compensation costs. In a similar time, *our workmen's compensation loss ratio went from 80.24 to 34.4 and saved a very considerable amount of money in workmen's compensation for the corporation as a whole.*

That is money in the till as a result of applying the methods of training to the problem of accident prevention. If you can do it in that field, you can do it in any other field where things go wrong for the three reasons mentioned above.

Down in the Maryland Peninsula, we have a chicken processing plant. Built in 1945, the engineers said it would have a daily capacity of 32,000 chickens processed. In 1949, that plant processed *65,000,* an increase of 100%, with a 57% increase in the number of people on the payroll. That result is a consequence—and the hard-boiled line fellows would tell you this—of the application of the things I have been talking about. Here is a note out of the file:

"The direct labor cost per unit of finished product has shown a constant decline even though wages have been increased every year, including 1950."

Most of the employees in that chicken processing plant are Negroes. We have a practice, at least once a year, of answering the employee's question, "How am I doing?" We call it a performance

review. During 1949, we completed performance reviews on every employee in that plant, and one of the Negro boys, who had spent several years in the Army, wrote on his performance review:

"This is the first time in this part of the country that I have had the experience of being treated like an American citizen."

Having in mind that the vast number of people on that plant payroll are Negroes, — and getting a reaction like that, I think you would agree with me that you don't need any fancy gadgets in order to increase productivity and production. That message says to us that the hearts of the employed people are being given to the job, in addition to their hands. Their hearts are back of it, and that is what you get when you practice sound principles of personnel administration; it does not make any difference where or with what kind of people; we deal with all of them, including a thousand natives in the Philippines.

TODAY'S CHALLENGE

You may say, "Why so much confidence in the results to be achieved by the use of these principles and incentives of personnel administration?" I reply,— Because they are *so universally acceptable that no one dares oppose them; because there is no satisfactory substitute;* because they *reduce the costs of operating a business and thereby contribute to the long-term advantage of owners, workers, and customers from an economic standpoint;* because they *increase productivity and thereby help to raise standards of economic well-being;* because they meet *the paramount challenge of our time,* and that is where leadership comes in.

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Birds-eye view of Footburt transfer drilling machine shows station units required to drill, chamfer and tap all holes in both ends of cylinder blocks.

Speeding Production with Modern Transfer Equipment

By JOSEPH OLENDER
Mechanical Engineer
Indianapolis Truck Engine Works
International Harvester Co.

The technique of planning and operating machining lines with high-precision, high-production transfer equipment. Electronic controls and gages, pre-set tools, and banks are some of the devices employed.

THE COMPANY'S RECENT announcement of their new line of trucks, climaxed a tooling program which represented an investment of more than $30,000,000.

The new "L" line of trucks required the finest equipment available to produce a new high quality, high compression engine, at the Indianapolis Truck Engine Works. Three basic models are built.

SYNCHRONIZED PLANNING

Planning, research and preparation for production of the new "L" line, while coordinating the transfer of our "Green Diamond" engine line to Harvester's Springfield, Ohio, Works, required more than a year of continued effort. A select planning group was organized and divorced from their regular duties, in order that they might concentrate on the Silver Diamond project.

Many developments and ideas came from our production and engineering personnel, but I want to give due credit to the vast number of engineers representing the machine and cutting tool vendors, for their whole-hearted cooperation in making this project a success. Without this great pool of engineering resources and their knowledge of their specialized field, I am sure our project would not have been so successful. When the rough plans and estimates were completed, both engineering and manufacturing groups were invited to analyze our proposals. This enabled us to realize the best know-how for our planning procedures.

First line machine tool builders were invited to quote on the necessary equipment, and were limited to three and not more than five vendors. This plan eliminated a great amount of confusion which is usually characteristic with a major tooling program. In order to streamline contacts with representing sales engineers, we arranged a schedule of appointments. Letters to that effect were sent to every selected supplier, which enabled them to arrange their visits.

Emphasis on sturdy and accurate machine construction was a program keynote. Coupled with advanced product engineering, sufficient safety factors were stressed for long range quality in the product.

The new plant layout emphasized minimum material handling. Machining

Automatic Inspection for Selective Assembly

"One automatic unit inspects 500 pistons per hour. It stamps them with the proper classification, according to size, and then a small red light signals the operator to indicate the proper slide conveyor to which the checked piston is transferred. Another machine checks and classifies in a matter of seconds the diameter, roundness, taper, and bell-mouth of all cylinder bores in each engine block. This is followed by selective assembly of blocks with matching pistons."

From a description of transfer machine operations at the General Motors Oldsmobile Plant, Lansing, Michigan, in *"The Potentials of Automatic Methods"* by H. E. Blank, Jr. in the *Proceedings of the Fifth Annual SAM Time Study and Methods Conference, April 1950.*

Adapted from a paper presented at the 18th Annual Meeting of the American Society of Tool Engineers, Philadelphia, Pa.

lines were laid out to spur into the main assembly building at a point approximately where the manufactured parts are sub-assembled or assembled to the engine. Purchased items were located conveniently between the engine assembly lines approximately at the points where the parts are used. Effects of the combined material flow has reduced trucking and material handling and has resulted in a very substantial saving.

Selecting the finest and most modern equipment necessary to give maximum manufacturing efficiency, required careful planning. The original plan for retooling the plant had as its first objective the comparison of two manufacturing plans:

(1) a manufacturing plan, using conventional equipment only,

(2) a manufacturing plan, calling for use of high production, transfer and single purpose machinery and equipment, wherever it could be used to advantage over conventional equipment.

Plan 2 was superior to Plan 1 because it permitted us to realize our manufacturing goals with less floor space, higher production and less overall capital investment. Virtually every piece of equipment in the engine plant was relocated. These moves were necessary to provide streamlined facilities for efficiency and increased production. Several building extensions were added to house a new engine assembly building and metallurgical laboratory.

TRANSFER AND SPECIAL MACHINES

In order to meet the production demands on the Silver Diamond machining lines, transfer equipment was selected for the cylinder block, cylinder head and the cast-in-block main bearing caps.

Transfer equipment for the cylinder block line consists of Ingersoll equipment for all milling, cam and crank boring and rough cylinder boring operations. Footburt transfer equipment is used for drilling, reaming, boring and chamfering operations. A special open type Sundstrand transfer mill for the cylinder head line completes all milling operations with the exception of the combustion chambers; these are precision milled on a pair of Cincinnati Profilers.

Natco transfer machines are used for all of the drilling, reaming, tapping and valve seating operations. These operations are cycled at 60 seconds. Most of the milling which is performed on alloyed cast iron, Brinnelling approximately 220, is being run between 45 and 60 in. feed per minute.

The water pump bodies are fully machined on a special Cross index machine which completes a rough foundry casting into a 100% finished part at the rate of 60 pieces per hour. This machine is capable of producing much higher production.

Oil pumps likewise are produced on a compact drum type Cross machine with the only other remaining operation being precision boring of gear pockets and shaft holes. These are machined at the rate of 60 pieces per hour.

Crankshafts are rough and finish turned on LeBlond crank turning equipment of the latest design. The pin lathes are equipped with double end drives and are helical geared; some with anti-backlash gearing. These machines are doing an excellent job of preparing our cranks for the "IW" crank grinders.

Timing gear teeth are cut on 6-Station Lees-Bradner vertical hobbing machines with 2 and 4 start hobs, holding closer accuracy than was formerly obtained on single spindle hobbing machines with single thread hobs.

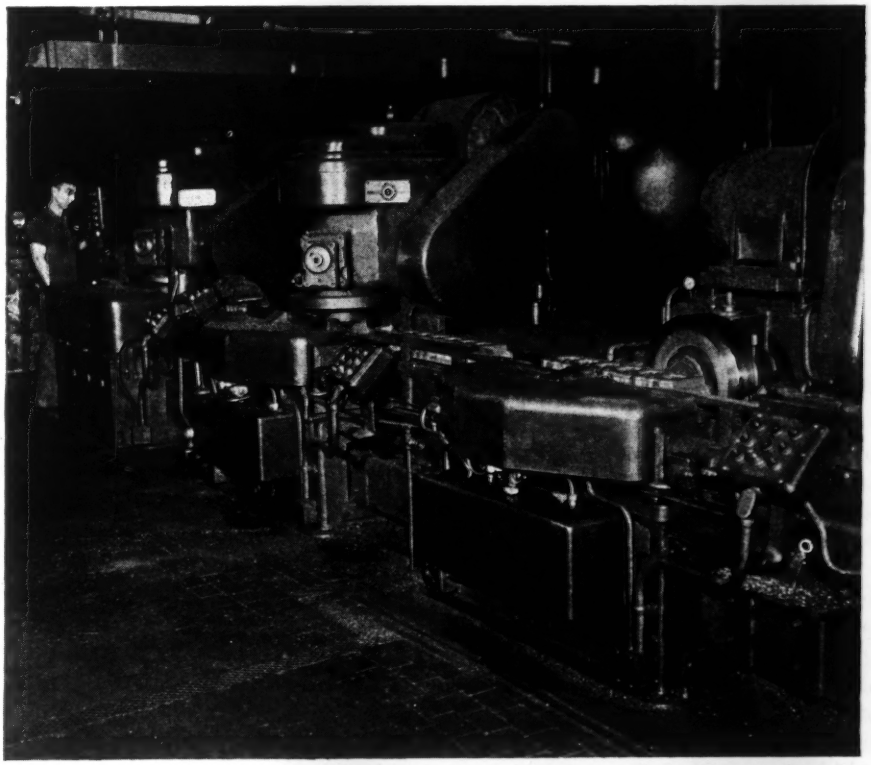
Gisholt Dynetric Balancers automatically find and record the crankshaft unbalance which is corrected in the second station of the machine.

Multiple wheel "IW" Grinders finish grind simultaneously five diameters on the crankshaft to plus or minus three-ten thousandths tolerance. Similar machines are used on the camshaft lines.

Valve guide bushings are pressed in and pull broached to a .001 tolerance in a special automatic cycle Oilgear broaching machine. Tool life has been increased over 500% and the quality has been improved greatly. Latest type equipment and manufacturing principles are employed for precision boring, electro-size honing, internal grinding, gear finishing and broaching.

An interesting piece of gaging equipment is the automatic electronic hole checker in the Silver Diamond cylinder block line. This device assures that all of the holes are drilled, and are to the correct depth prior to tapping. Red lights on a panel board above the checking machine indicate improper drilling.

There are many helpful innovations spotted throughout the entire plant which assist the workmen to perform their work with greater ease, reducing the fatigue factor and increasing their efficiency.



A Six-station Sundstrand transfer machine finish mills the valve cover surface and spark plug side, automatically turns the head 180 degrees, rough mills the combustion face and finish mills manifold side.

ELECTRONICS IN SAFETY

All transfer, semi and fully automatic cycle machines are equipped with electrical interlocks, coupled with mechanical "safeties" assuring proper location and clamping of parts being processed. Panel lights at the operator's station indicate whether work stations are cycling correctly.

BANKS

Floor space has been provided between each transfer unit in the cylinder block and cylinder head machining lines, for building up banks of progressively machined castings. These banks assure continuity of line production during tool changes or breakdowns. Banks are used on many other parts, and lines, where maintaining an even material flow for continuous shift operation is essential.

TOOL CARE CONSIDERED

Consideration was given to tool care problems while the program was progressing through its planning stages. "Down-Time" is the worst production evil on any transfer or automatic cycle type machine. Great strides were made in eliminating "down-time" by designing equipment with quick change and pre-set tooling facilities.

All transfer machines have tool racks filled with pre-set tools, and gage holders in convenient locations. Quick removable guide rails and cutter set pads which employ the use of magnetic set gages, in easy-to-reach locations, are installed on the milling machines. Such features enable the production departments to make a complete change of cutting tools in less than 45 minutes on most of the large transfer machines.

CARBIDE MILLING

We have applied solid carbide to numerous operations throughout the plant with a high degree of success. Solid carbides will not lend themselves economically to every job, but we find new applications for them every day. They have been applied successfully to many older type machines with outstanding results. As an example, milling manifolds on a 21 year old Newton Vertical rotary mill; average production was 150 pieces per grind with standard tungsten carbide tipped blade cutters; this was increased to 2,500 pieces per grind with fine pitch solid carbide cutters. Finish milling the top and bottom of our Red and Blue cylinder blocks on a 20 year old Ingersoll vertical rotary milling machine resulted in an increase from 100 pieces per grind using cast metal blades, to more than 5,000 pieces per grind with fine pitch solid carbide inserted blade milling cutters of Wesson design.

The average for milling with inserted tungsten carbide blade cutters on our Silver Diamond block line is over 1,300 pieces per grind with high runs of approximately 5,000 pieces per grind. The average for all boring operations on the block line is over 4,600 pieces per grind, with a high run of 35,350 pieces to date on finish boring of the rear main bearing counterbore. The original cutter is still on the machine. Sounds fantastic — but true.

QUALITY CONTROL — SAMPLING INSPECTION

Inspection and quality control departments played an important role in selecting the most modern and accurate gaging equipment. Better finishes and closer tolerances are held by using effective quality control methods with a practical touch. This eliminates the penalty of excessive cost.

Vital operations are covered by machine control charts and a constant vigil is kept by the line inspectors and the machine operations, to see that the piece parts conform to stastistical quality control standards. By maintaining high quality standards the door is opened to a new development in inspection technique, called "Sampling Inspection."

Tool settings on critical and other important dimensions are held to approximately 50% of the specified engineering print tolerances. Certain quantities of sample parts are selected at random, depending on the lot size ready for inspection. Every part in the sample group must check 100% to the engineering specifications, or the entire lot of parts is rejected. The use of direct reading inspection equipment is essential in the development of such a program.

PRE-PRODUCTION STUDY

Analytical pre-production studies of this new tooling, were tried in this program and have proven very satisfactory. This was accomplished by having the job in operation before placing the production manpower on the equipment for production. Some of the benefits derived from this program have been the elimination of most of the "first production bugs," systematic channeling of changes, and better knowledge of "job know how" by the supervision.

The usual confusion in instructing operators was minimized, safety hazards were reduced and more accurate time standards were established.

CHIP DISPOSAL

To maintain good plant-wide housekeeping, we have inaugurated a weekly competitive employe safety and housekeeping program. Each week the winning departments display the "honor flag" and a suitable award is presented to the final winner at the close of the year.

Under floor chip conveyors are installed in production departments using transfer type equipment. Chips and borings are conveyed to a junction point in the machine lines where they are picked up automatically by an elevator and discharged into a stationary gondola. Care is exercised to maintain chips and borings free from oil, water and other wastes, before being transferred to the foundry briquetting machine.

PATTERN AND FIXTURE STORAGE

Our Patterns and fixtures are picked up and taken to a central pattern storage in the foundry, and a central fixture storage in the machine shop. They are then checked to blueprint and repaired before being stored for future use. This systematic repair work which is done as fill-in work, has resulted in a very substantial yearly savings.

RECEIVING PURCHASED MATERIALS

Most of the purchased parts are delivered to the receiving dock by truck. There most parts are palletized, if not already so prepared and transported by finger lift trucks to the receiving floor. Samples are then taken for quality control check, and quantities are verified by counting or weighing. As soon as they are approved for quality, the material is routed by finger lift truck to various storage areas, adjacent to the point of usage. The time limit set for the receiving, checking and releasing process is 48 hours. No productive material store room, in the common usage of the term, is maintained.

Incentive Management and Profit Sharing

By THOMAS P. PIKE

President, Thomas P. Pike Drilling Company,
Los Angeles, California

A report on an application of the Incentive Management philosophy.

IN THE PAST, generally speaking, Incentive Management has been based on the payment of greater rewards for increase in production, but Incentive Management today goes far beyond this simple concept of pay incentives. *James Lincoln* defines Incentive Management as a philosophy of industry and of life, one which depends primarily for success on the development of latent abilities in the individual. According to Lincoln, it is not only a method of wage payment, it is an economic system.

A brief definition of Incentive Management as we understand it would be: a philosophy of business operation which grants to each worker an opportunity to participate in all aspects of the job and, in addition, to participate in the profits from savings he helps to create.

Being more of a philosophy than a plan, however, Incentive Management cannot be fully defined in a single sentence. By the same token, the formula for Incentive Management does not come in a package form which can be bought and installed like a machine. Let us rather think of it as a form of business operation which has as its basic creed the premise that the human individual has a God-given dignity which makes him a central factor in the system. It is a form of business operation based on the belief that man has limitless latent abilities which can be developed for the benefit of all concerned under the proper conditions. It is a form of business operation which carries the conviction that it is Management's great responsibility to provide opportunity and incentives to develop these latent and limitless abilities of its men.

Incentive Management is a form of business operation based on the conviction that maximum productivity can be achieved by the full release of the ability potential in both workers and executives whenever the proper channels for productive effort are provided. It is the modern and progressive form of business operation based on the fact that the primary goal of any business enterprise should be the production of more and more units at less and less cost . . . and that profit should therefore become the secondary consideration because it is bound to follow. Such systems in operation have proven repeatedly that profit can and does become larger under them. Finally, Incentive Management, as a system, shares its increase in profit with the men who helped create such increases through their increased interest in their jobs and their increased efficiency, sharing these profits in accordance with each man's contribution toward the success of the project.

THE DYNAMIC PRINCIPLE

These then are the underlying principles of Incentive Management. They are completely democratic and they have their roots in the best traditions of American freedom. They are positive and dynamic; they are sound and good principles of business operation because they bring good results. They are good because they advocate the same kind of rights of which the founders of our nation were so conscious 175 years ago when they wrote the Declaration of Independence.

The natural question then is, how can these fundamental principles of Incentive Management be implemented and applied effectively to modern business management?

We must first present the opportunities and incentives which are so vital to the progressive development of men in industry. Such opportunities and incentives can best be provided by a combined management-sharing plan, profit-sharing plan and employee benefit program best suited to the particular business under consideration.

The many different combinations of these plans are indicated in Table "A" below. This material has been drawn up by *Joseph Meier*, Executive Secretary of the *Council of Profit Sharing Industries.*

PROFIT-SHARING PLANS

TYPICAL FEATURES

TABLE "A"

Management Sharing

Boards and Committees
1. Elected
2. Appointed
3. Employee Majority
4. Employee Minority
5. Management Veto
6. Management No Veto

Loan Committee
Safety Committee
Price Setting Committee
Production Committee
Shop Committee
Suggestion Committee
Factory Committee
Trust Committee
Sales Committee
Executive Committee
Advisory Committee
Junior Board of Dir.
Employee Representation on Board of Directors

Employee Benefits

Credit Union
Paid Vacations
Educational Opportunities
Sickness Benefits
Accident Benefits
Disability Benefits
Retirement Annuities
Group Life Insurance

(Table "A" continued on page 12)

(Table "A" continued from page 11)

Income Sharing

- Cash Production Bonus
  1. Not Predetermined
  2. Predetermined
     a. Share and share alike
     b. Share in proportion to earnings
     c. Share in proportion to quality of service
- Length of Service Bonus
- Wage Dividend
- Stock Ownership
- Cost Savings Sharing
- Cash Production Sharing (Compensation as a percentage of total production)
- Cost of Living Wage Adjustment
- Certificates of Deposit
- Thrift Plan (Sav's Bonus)
- Guaranteed Annual Wage
- Profit-Sharing Trust Pl.
  1. Noncontributory
  2. Contributory

Table "A" represents the features of profit-sharing plans which are in general use. The Employee Benefits may or may not contain elements of co-ownership or co-management. These features appear in as many different combinations as may be required to suit the needs of the companies which employ them.

Space would not permit a full discussion of the endless possible combination of the above features, but those interested will find a great deal of concrete information on the subject in *"The Profit Sharing Manual,"** published by the Council of Profit Sharing Industries, First National Tower, Akron, Ohio, and in Kenneth Thompson's book, *"Profit Sharing,"*† published by Harper's.

In *Thomas P. Pike Drilling Company*, we have been operating under our plan of Incentive Management with Profit Sharing for the past several years and to the definite benefit of all concerned. The steps which we had to take in getting our plan under way are so typical that they should be of interest to anyone contemplating a similar plan.

The step we considered of first and foremost importance was an honest and searching self-analysis on the part of the management and owners as to reasons why we were in business. To this end we asked ourselves a few direct questions such as the following:

1. Are we in business solely for the purpose of making money, or do we acknowledge a responsibility toward employees and consumers as well as management and owners?
2. Do we want our employees to attain a sense of dignity, satisfaction and security through working with others in a well organized business at fair wages?
3. Are we willing to afford our employees the necessary opportunities and incentives in the form of management-sharing, employee benefits and profit sharing?
4. Above all, are we as managers and owners willing to work to create these conditions?
5. And finally, are we willing to say that we will?

This latter question is important because it is absolutely essential that owners and top management be sold on the principles of Incentive Management before they can sell the idea to their employees. In *Pike Drilling Company*, when the owners and managers were able to answer the above questions affirmatively, we put our Incentive Management Program in writing and posted it where everyone interested could see it.

This was only a beginning however. The next step was to gain the interest and confidence of our men in the overall methods and objectives of the plan. This was not a matter which we accomplished overnight, nor was it easy to do. We had to overcome skepticism by repeated affirmations of our sincerity and willingness to do everything we had promised. We talked to our men singly and in groups until the details of the plan had become familiar to all.

THE ADVISORY BOARD

We next took the most important single step in our plan, which was to form what we chose to call the Advisory Board. This is our management-sharing group and it is a most efficient one. Its membership consists of our president, who acts as chairman, two vice-presidents, the treasurer, drilling superintendent and his assistants, head mechanic, welder, truck driver, yardman, all tool pushers (foremen) and one crew representative from each drilling rig.

The Advisory Board meets monthly at a dinner and is authorized to discuss policy and make decisions on matters concerning any and all phases of the company's entire operation. It has made such important decisions as determining that an employee must work at least nine months of the current fiscal year before he is qualified to participate in Profit Sharing. The matter of adopting certain employee benefit programs has been passed upon by this Board, including Blue Cross and Group Life Insurance.

The Advisory Board has proven to be a very efficient channel of two-way communication between management and the workers. It has provided a means for men and management to become acquainted, and it has developed a real mutual understanding and confidence. It is to this group that the management gives a monthly verbal report on company financial data, especially profit and loss figures. We encourage questions and no necessary information is withheld.

Participation in the Board's activities gives the worker the opportunity to gain recognition for himself and to contribute his ideas as positive factors in the operation of the business. It enables him to share information on matters traditionally considered as top secrets for management only.

Thus the basic need for human recognition and status is satisfied. Countless suggestions for increased efficiency and the elimination of waste are made by our men through the Advisory Board. For each workable suggestion, the worker submitting it was given due credit in our monthly house organ, as well as a cash award ranging from $5.00 to $200.00. Most important of all, the activities of the Board have provided the opportunities and incentives through which our men are realizing job satisfaction and making progress in their individual self-development.

THE HOUSE ORGAN

When our Incentive Management Plan was first put into operation, the minutes of each meeting of the Advisory Board were carefully taken and copies sent out to each employee in mimeographed form. This practice finally developed into a house organ called *"The Monthly Tour,"* which is edited by the office staff in Los Angeles. The editorial content includes personal biographies, news items, articles on Americanism, pictures of employees and their families, and light humor, as well as statements on work in progress, prospects for new work, a section devoted to safety, com-

*See *Advanced Management*, February 1950, for review by Ordway Tead.

†See *Advanced Management*, June 1949, for review by James W. Tower.

pany finances and an analysis of the downtime incurred each month by each operating crew or group.

JUNIOR ADVISORY BOARDS

In order to extend our management-sharing program right down to the basic unit of our particular type of business (the five-man drilling crew, which is headed up by a "driller") we have set up "Junior Advisory Boards" which are headed by the "tool pusher" or foreman for each rig and crew. These units function in the same manner as the Senior Advisory Board and the results of the monthly meetings are carried to the Senior Board by the elected crew member and tool pushers. Thus, we are attempting to channel the collective experience of our entire organization into the main stream of management.

PROFIT SHARING

As the final step to furnish a financial incentive, we have established a profit-sharing system, whereby at the end of each fiscal year we distribute to each eligible employee a predetermined percentage of our profits, (25% after taxes), and in cash. The Advisory Board arrived at a fair and equitable distribution among the various job classifications which it decided as most accurately representing the contribution of each employee toward the success of the company's over-all operation.

The results of our first full year of operation under the Incentive Management Plan were gratifying. The morale of the organization was high and has continued that way. Our labor turnover has decreased steadily since the plan was inaugurated. The volume of sales showed a substantial increase the first year and our net profits after taxes and profit sharing have risen to record levels. These gratifying trends continued and are continuing to develop each year and, above all, worker productivity has risen steadily.

In discussing our own case history, we are fully aware that we have only made a small beginning in the field of Incentive Management, particularly as contract oil well drilling is a hazardous business involving large financial risks, but we do believe that the best method of minimizing these hazards and risks is to inject the spirit of teamwork and partnership into our drilling crews, pushers, and managers.

Incentive Management can be made to work if the entire force wants it to work. We, of *Pike Drilling*, are very much alive to the challenge it presents and are willing to accept its responsibilities. And we are not alone in our practice and endorsement of this vital factor in future harmonious and profitable management methods. Increasing numbers of companies, large and small, and in all types of business, are recognizing and applying these principles.

As an example, *L. R. Boulware*, vice-president of *General Electric*, has this to say about his company: "General Electric is in the process of developing a new way of life. The first step is setting up two-way communication between the individual employee and his immediate boss, and at each successive management level right up to the top. Naturally," said Mr. Boulware, "the workers want good pay, good working conditions, good bosses and steady work. But we are finding that they want security that is more than financial. They want the full facts about their jobs and the opportunities and limitations surrounding the employer. They want to have a say in the interpretation and application of those facts. Furthermore, we find that the workers want what might be called spiritual satisfactions. They want to be treated with respect. They want fairness, and they want a sense of belonging. They want participation toward a common objective, in accordance with common desire. They want a feeling of worthwhile accomplishment, and they want the work to be interesting and gratifying. These are all part of a '9-Point Job Improvement Program' General Electric has launched."

Application of the *Scanlon Plan* to the *Adamson Company* of East Palestine, Ohio, has resulted in a tremendous increase in profits for the company and bonuses for the employees ranging from 50% to 80% of the total earnings. In the most recent application of this plan at the *La Pointe Machine Tool Company* of Hudson, Massachusetts, the plan has resulted in an increase in profits together with a 19% bonus for all employees.

The essence of the Scanlon Plan is to give the workers real participation both in suggesting and carrying out ideas for increased efficiency. And its merit, from their point of view, is increased usefulness. Since he is in constant touch with the company and its problems, the worker acquires a sense of security also. When bad times come, he feels he is being given a fighting chance to carry on . . . which, according to *Mr. Scanlon*, is the main thing an American worker wants.

LABOR NOT A COMMODITY ALONE

Under Incentive Management plans, we are dealing with PEOPLE. Labor is no longer a commodity to be thought of as something one buys along with machinery and raw materials, and to be purchased as such at the lowest market rate. Management, under our new and progressive philosophy, must provide the enlightened leadership for developing the limitless latent ability of men, which in turn will release vast potentials of human effort.

In our line of business we have, in our working forces, the wherewithal to revolutionize the economics of oil well drilling. Whether we accomplish this or not depends in a large measure upon the type of vision, leadership and unselfishness that we in management are able to offer our superintendents, pushers and drilling crews. The same facts and principles apply to other lines of business with equal force.

James Lincoln states, and we heartily concur, that if all American productive genius could concentrate upon the problem of incentive, tremendous increased productivity would follow with higher rewards for the worker, lower prices to the consumer, greatly augmented purchasing power, and a higher standard of living for all. Thus the survival of our dynamic system of freedom in enterprise would be assured.

In conclusion, let us point out to forward-looking men in modern management that successful industrialists are beginning to realize that the modern machinery which our engineers have developed is productive in direct relationship to the efficiency and interest of the men who run it.

In the words of *Howard Chase* of *General Foods Corporation*, "95% of management brains and energies have been devoted to the solution of technical problems and only 5%, if that, to the solutions of human relations problems. In the future, managements of corporations that survive will devote the larger part of their brains, energies and sympathies to their human resources."

Increasing Office Productivity Through Training

By JAMES W. QUIGG

Manager of Supervisory Training,
The Air Reduction Co.

How basic training in fundamentals produces results when geared to specialized techniques for work analysis and measurement.

ONE OF THE CRITICAL problems that faces American industry today is the control of the quality, cost and quantity of production. The usual approach to the solution of this problem is through the tightening up of existing procedures, elimination of waste in materials and time, simplification of work methods, processes, etc. We are, of course, doing these things, but we are also making an additional approach through the education and training of our employees.

Air Reduction's training program comprises two distinct areas—first, the area of broad basic training in fundamentals and, second, the area of specialized training in specific departmental activities. In both of these areas, primary emphasis is placed on training supervisory personnel. The goal of our top management is to get every member of our organization so oriented in his economic life that he will want to do the best work he is capable of doing.

To effect such orientation is a large order. It requires recognition of four basic factors: (1) the establishment of a sound human relations program (2) application of the principles of sound human relations (3) application of the principles of sound management and (4) recognition by each member of our organization that our customer is our boss.

The responsibility for working toward this goal rests squarely on the shoulders of our management. In *Air Reduction,* management includes every supervisor. It is company policy that supervisors are part of management and are expected to exercise their authority and responsibilities as members of the management team.

FUNDAMENTALS OF MANAGEMENT DEVELOPMENT

Our program of employee education and training—we call it "management development"—begins with management itself. It actually began with top management because our first management development group included the chairman of the board, the president of the company and all other senior officers. Subsequent groups were well diversified in executive department representation.

Group meetings are conducted on a conference rather than on a lecture basis. Each group is limited to twelve members in order to facilitate across-the-board discussion by all and meets once a week for eighteen weeks. The meetings are scheduled to last approximately two hours. The scope of the program is confined to four general areas: *economics, management principles, problem analysis and solution, and human relations.*

ECONOMICS OF CUSTOMER SATISFACTION

In the area of *economics* we explore the purpose and function of business in a competitive economy. We discuss direct competition between similar products made by our company and other companies and indirect competition offered by other businesses. We explore and stress the fundamental fact that the customer's verdict of the relative value to him of our products or service, in comparison with similar products or services offered by our competitors, sets our product standards of quality and price. Also, we discuss and relate to our own industry the competition for workers and for capital.

We examine departmental operations and problems and the effect of various incidents on our customer relationships.

Sometimes management, itself, can and does create many of the problems which it must subsequently solve. Through discussion of case histories, we secure agreement from the group members that our company's competitive position is maintained through the *controls* that are exercised at *every supervisory* or management level. Finally, by analysis of various comparative data pertaining to our operations over a period of years we determine what happened, why it happened, what the effect was, and what we can do to further the favorable aspects and lessen the unfavorable ones.

FROM FACTS TO POLICIES — AND BACK

In the next of the four areas of basic fundamentals, we review the *principles of effective management* and make a searching and sometimes painful examination of how these principles are applied and followed in the sphere of each individual's responsibility. We examine critically the subject of company policies. This examination touches upon an area of considerable vagueness. So we attempt to develop an understanding of:

1. Why policies are necessary.
2. What a policy represents.
3. What makes a policy.
4. Who makes a policy.

Adapted from a paper presented at the 31st Annual Conference of the National Association of Cost Accountants.

Through discussion of the functions that are performed by each management level, we develop an understanding of the relationship that should exist between the principle inherent in the policy and performance of the functions relevant to the policy. From the group members we secure examples of administrative policy stipulations that have proven unwieldy or troublesome in the performance of the functions involved. Analysis of such policies invariably indicates that management at the particular policy-making level did not have *all the facts* pertinent to the situation.

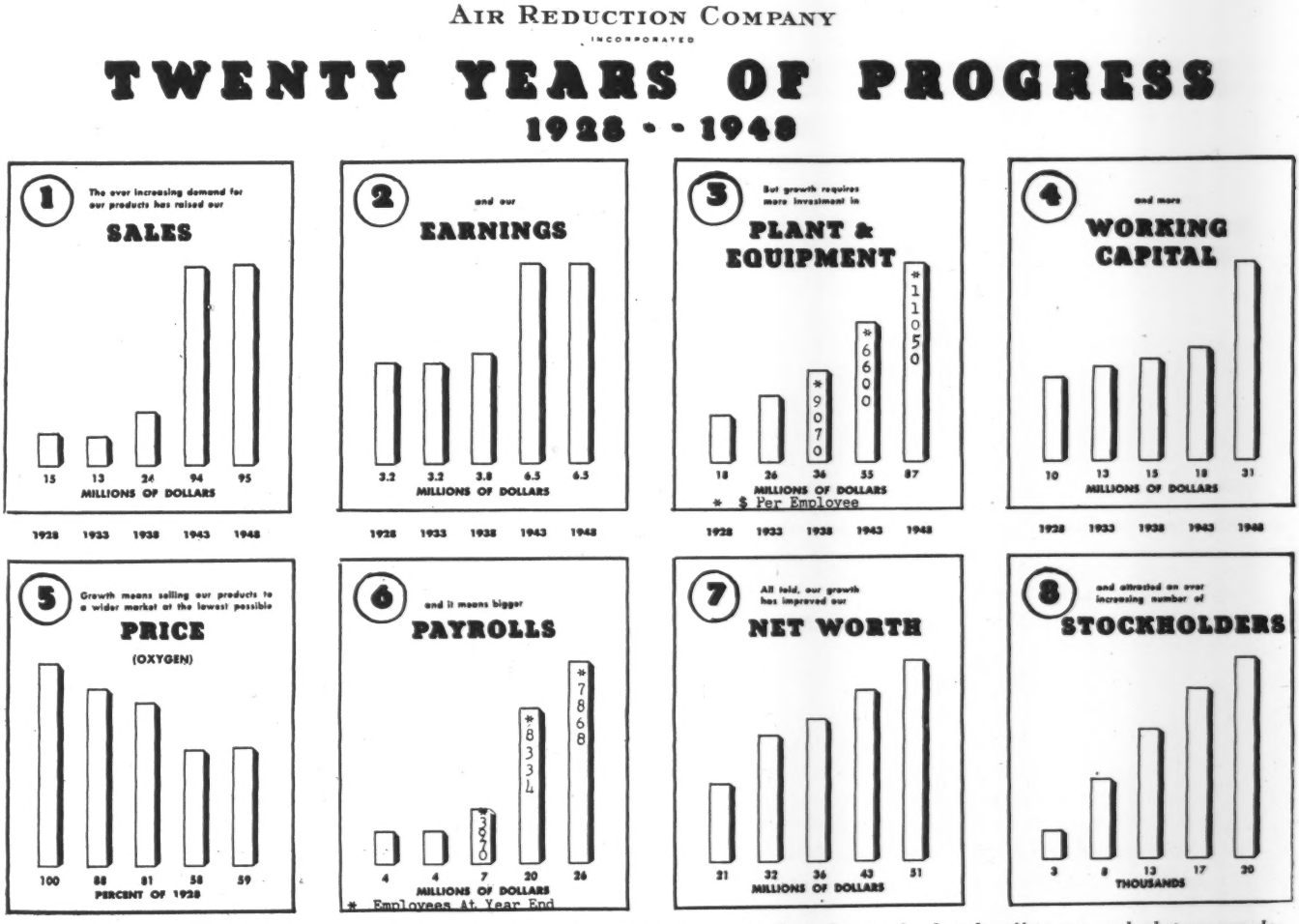
As a result of such analysis, we are able to ask the $64 question: Who is responsible for providing management at each policy level with the facts upon which to formulate sound, logical, workable policies? Thus we develop acceptance of the fact that each group member has a definite responsibility in the policy-making function. The emphasis here is on making every member of management understand the important part he can play in the formation of company policy and his responsibility to perform his part. This he can do by pumping upward through regular channels of communications data pertinent to his area of operation, data which upper management must have if it is to make sound decisions which he, in turn, can administer intelligently and efficiently.

In line with our belief that a company is only as strong as the sum total of the developed potential of all its employees, we are training our supervisors to develop their personnel in this phase of industrial democracy at work. Line, staff, service and control functions are examined, defined and related to the activities of each group member and to the organization as a whole. The clarification of these functional relationships is important because there is an astonishing lack of understanding on this subject, particularly as to the real purpose of the staff, service and control functions and to the value that can accrue through a fuller utilization of such important auxiliaries.

Finally, organizational problems which are of direct interest to the group members are examined in relationship to management principles. Departmental weaknesses in organization and management are thus highlighted for corrective action. And we do take action.

PEOPLE AND PROBLEMS

In the area of *problem analysis and solution*, diversified case histories supplied by group members are examined in detail. In personnel problems such analysis serves to highlight the fact that poor employee attitude is merely a symptom—that it is a *result* of various underlying causes. By analysis of facts we get the group members to accept the



"By analysis of comparative data over a period of years we determine what happened, why it happened, what the effect was, and what we can do to improve." One of the many special charts used to highlight significant points.

principle that control of employee attitude is an essential part of a supervisor's job.

We introduce what is known as the "problem solving pattern" and the "problem-solution-reasons-results pattern." The former is an excellent tool for solving *any kind* of a human relations problem. The latter is practically a must if a supervisor wants to get his problem solution across so that it sticks.

Since people and problems are practically synonymous, the group members receive intensive drill in the use of these two patterns throughout the remainder of the conference meetings, with special emphasis on the first factor of our problem-solving technique—to get *all* the facts. One of our big problems is to get people to awaken to facts, to distinguish between opinion and fact, and to weigh and evaluate facts. Trying to teach people to get *all* the facts is, perhaps, the most difficult problem of all.

The group work in the three general areas just covered provides a basic approach to the last broad training area, that of *human relations*. Here we get into an examination of the basic wants and urges of people generally. We develop a pattern of the average man's basic sources of satisfaction. Through case histories we show how on-job attitudes are affected by these basic wants and urges.

We demonstrate how a man's *getting* the things he wants and values develops a *positive* attitude and we show how his *failure* to get those things develops a *negative* attitude. From these case histories we develop this principle: "It is only common sense to refrain from doing those things that unnecessarily threaten a person's basic wants and feelings and *to do* everything possible to build up a person's sense of satisfaction."

The balance of our conference meetings are devoted to the practical application of this principle on a daily basis on the job. Various basic "tools" are provided and the supervisors are drilled in use of them.

In our final sessions on basic fundamentals, we tie the four general areas together by demonstrating that any action in one area has an immediate reaction in all the other areas. We try to develop a fuller understanding of cause and effect. The degree to which we are successful in helping our people through our understanding of what makes them "tick" is the degree to which we can assure success of the specialized training part of our program.

CLERICAL MAN-HOURS BUDGET

As in the broad basic area, primary emphasis in this specialized part of our training program is placed on the supervisor who, through application of the principles of sound management, controls the capacity-and-will-to-produce of the employees under his jurisdiction. Since the office manager's prime responsibility is control of the quality, quantity and cost of his production, we provide him with a tool by which he can evaluate his clerical work load and control his clerical work costs.

This tool is a clerical man-hours budget. It is based on an accurate analysis of work performed by every clerical employee and the development of a standard unit time for each kind of work included in a job. These analyses are summarized functionally, job by job and by department, and the resulting "tool" provides the office manager with a rather exact picture of his operations, function by function, job by job, person by person, and by departments. It shows the standard hours of time required to do a job versus the actual time taken by the personnel on the job. Inequities are thus highlighted for analysis and corrective action.

This part of our management development program is called "supervisory training in clerical cost control" and we get quickly to fundamentals. We gain acceptance of the fact that clerical labor cost is a major factor in business and that it represents a large part of the selling expense and cuts deeply into the margin of profit. In many locations the number of clerical employees will exceed or be close to the number of employees required to manufacture the products.

From this comparison we are able to drive home the fact that an hour of clerical labor is as much a commodity in our business as is a cylinder of gas, a cutting tip, or a can of carbide. We point out that if an office manager finds he can operate with one less employee at an average salary rate of $175 per month, the resulting annual saving in clerical cost is more than the profit on the sale of 4,700 cylinders of oxygen.

To accomplish the goal of securing maximum production at minimum expense, we must know both the volume of work that constitutes a fair production output for each job and the man-hour labor cost to produce it. The office manager must know also the best management methods by which he can obtain the required production from his employees, who are not machines that can be automatically geared to produce a given quantity but are variable human beings who must be recognized and treated as such. In the final analysis, the dual objective of maximum and economical production can be accomplished by the office manager only through the interest and cooperation of his personnel—through *his* stimulation of *their* will to produce.

There are several methods in use today that have been developed for the purpose of increasing productive output of employees. One method is to rule by force. That method means: produce or get out. Some other methods also tend to ignore human values and are neither economical of cost nor conducive to good morale. Happily, there are methods whereby management not only attains the required production but also builds up or develops employees so that they are genuinely interested in their work and are ready and qualified to assume more important responsibilities when opportunity for advancement occurs.

The first step in such a management method is to make sure that the work load is distributed fairly and that the employee can, with proper training, handle the volume of work assigned to him. Second, management should recognize that, while the average employee instinctively wants to do a good job and to be proud of it, just as instinctively that employee needs a feeling of security, job satisfaction and recognition. The employee wants to know where he stands in the eyes of management. Job knowledge and job performance, coupled with a sincere appreciation by the office manager when a job is well done, give the employee a satisfaction and a contentment that stimulate the inherent desire to do an even better job, and develops a sense of security and a feeling that he or she is truly a part of our company.

INADEQUACY OF PAST PERFORMANCE

The office manager must apply a definite means of measurement to de-

termine the load volume that constitutes the production requirement in each job. In the past, our office managers were not provided with such measurement technique. They relied on experience; i.e., in the majority of cases, the past performance of an employee or a group was accepted as a means of measurement. Actually, the volume of work produced per employee may have been above or below a reasonable average.

This, in turn, means that such past performance often became the production standard used by an office manager in preparing his personnel requirement budget for presentation to his management. Management checking of such budgets is often on the basis of company-wide averages and volumes and, here again, past performance becomes the guide. The use of past performance for controlling clerical expense is unsatisfactory for the reasons mentioned above and because: (1) an office manager desiring to satisfy his management may understate his requirements, with the result that he finds it necessary to incur overtime expense and possibly to do considerable detail work himself, thereby neglecting his prime responsibility as an administrator, or (2) he may overstate his requirements, feeling that he must have a reserve or cushion to meet some unforeseen condition or emergency.

However, through the application of the technique of clerical cost control, an office manager can establish definitely and accurately the number of man-hours of labor required to handle any given volume of any kind of clerical work. Obviously, the successful application of any such technique must also give full weight to human values and satisfy the inner needs of the individual. It should so stimulate interest that the employee will strive for improved performance and will regard an increase in salary as a reward for accomplishment rather than an inducement to work harder.

Enlightened management now generally accepts the fact that the problem of increasing production cannot be solved by pay increases alone. Through clerical work measurement and clerical cost control, it is easy to develop and assign a fair work load to each position and to give credit where credit is due. Such consideration of the individual will stimulate his interest which will in turn create a genuine enthusiasm. Increased production of work will follow naturally.

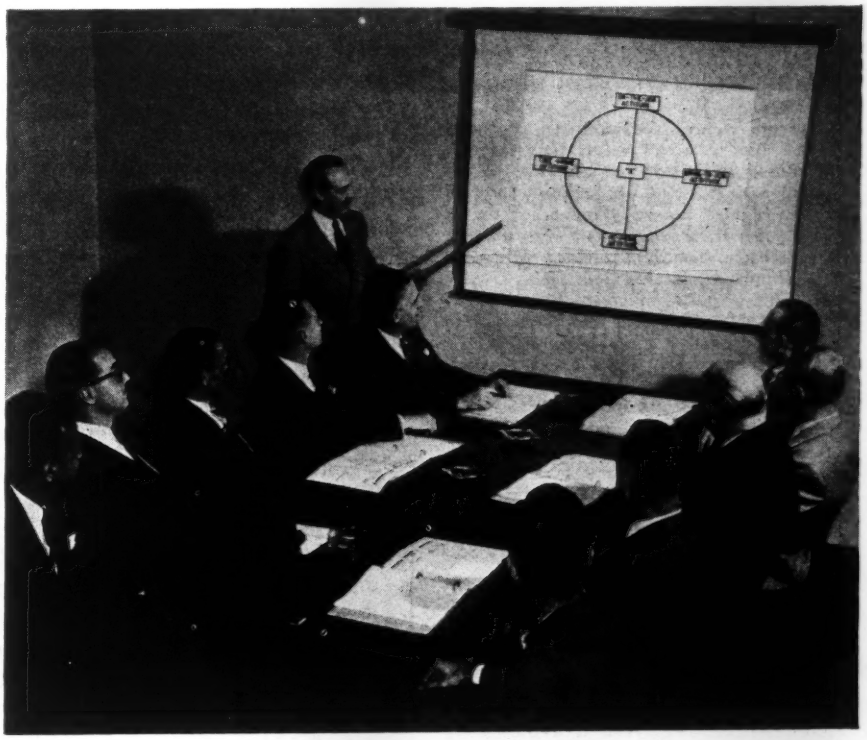
The office manager can rate accurately the performance of each employee and reward employees accordingly. The realization by an employee that his performance rating is known and will be used is, in itself, an incentive to a better performance.

Thus, through supervisory training in clerical cost control, the office manager learns the practical application of a management technique employing sound measurement standards, based on accurate time studies of operations performed at average speed, plus allowance for fatigue, personal needs, etc. There are in the average district office approximately 1,200 clerical operations, all of which have been timed and thoroughly tested. Through the use of the resulting standard unit times, a satisfactory load can be established for each position.

What is a satisfactory load? It is the number of units of work at the applicable standard unit time rate that can be produced by an *average* employee at the rate of six standard man-hours of work per eight-hour day. With the addition of certain allowance factors for fatigue, personal needs, etc. the result is interpreted as a standard minimum operating efficiency of 87.5 percent. An above-average employee will naturally perform an operation in less time than is allowed by the standard unit time for the operation. In such cases the standard unit time remains fixed and the above-average performance is reflected in a higher rating of efficiency for the individual, provided the available excess man-hours are utilized in some other positions or type of work.

THE TIME JOURNAL

In order to give credit to the proficiency of an individual, a simple "time journal" is used to record all work done by an employee beyond the regularly assigned duties of the position. This means that if employee "A" develops proficiency to a point where time is available to assist employee "B", "A" receives full credit for any work performed for "B" and an efficiency rating of 95 percent may result, instead of an otherwise possible 80 percent. A "time journal" form is maintained by each employee for each calendar month. On this form the employee records daily the man-hours of time sold to other positions, time purchased from other positions, time spent on special assign-



Fundamentals of "management development" are presented in group meetings on a conference basis.

ments, and also time devoted to Airco Association activities, time lost due to illness, early closing of office, holidays, etc.

Each employee receives full credit for time spent in assisting others, training others or being trained on work other than his own. An employee who receives assistance is charged with the purchased hours and is thereby penalized to the extent of them. Thus it is easy to compute the actual man-hours spent on a given position. Multiplying the current volume of work units by the applicable standard unit time gives the standard man-hours required to process the work load.

COST CONTROL GOALS

The broad objectives of supervisory training in clerical cost control are:

(1) To provide each office manager with and train him in the use of a monthly budget of clerical man-hours based on accurate, logical and reasonable standards to enable him to:
  (a) determine the man-hours of labor required for any clerical operation under his jurisdiction.
  (b) establish a proper work load for each clerical employee.
  (c) eliminate inequities in clerical work loads.
  (d) determine which employees have the more efficient production performance, thus affording sound basis for selection and retention of the better personnel plus development of potentially valuable personnel in need of training, quidance or reassignment of duties.
  (e) achieve simplification of work through elimination of unnecessary job operations.
  (f) secure overall performance efficiency by elimination of excess time through reassignment and consolidation of job operations and reduction through transfer or normal turnover of excess personnel or personnel who do not maintain the performance standard established for the job.
  (g) achieve more efficient utilization of available man-hours and reduction of non-productive man-hours.
  (h) administer his office with overall efficiency and economy.

(2) To develop and stimulate job interest, knowledge and performance on the part of each employee. A good employee knows that job proficiency plus work interest automatically build toward job security and advancement.

(3) To provide a standard for evaluating supervisors for advancement. The manner in which supervisors use the standards provided by the monthly budget of clerical man-hours affords a sound basis for evaluating their administrative capacity.

(4) To establish the clerical cost of preparing numerous special reports. In many cases 20 to 30 per cent of the time of two or more clerical employees is required to perform such work. With accurate costs available, appraisal can be made of the value of the results obtained versus the cost of data preparation.

APPRAISING THE PROGRAM

In the fall of 1948 the part of the program related to broad basic training in fundamentals was started at one of our plants which employed several hundred hourly workers. Within a few months, and before all of the supervisory personnel had participated in the program, production began to improve, costs were getting better, and all around performance was on the up grade. All management personnel at this plant have not completed the basic portion of the management development program. New production records were set, costs continued to improve, and the spirit of teamwork that exists between workers and supervisors is the best I have encountered at any factory location.

Encouraging reports of a general nature are received from nonfactory locations, together with reports of specific situations that have been resolved through use of the principles embodied in this part of our management development program. One very real result from the group conferences has been the increased understanding of functional and inter-departmental relationships and the development of a better team spirit among group members.

The second phase of our management development program, the area of specialized training in specific departmental activities, can be evaluated to a greater extent in terms of dollar results. For example, at location "A" the positions of 29 clerical employees were surveyed and clerical cost control was established as a tool for the office manager. Within a year the work force had been reduced by 13 people with a resulting saving in direct labor clerical cost of approximately $27,000. At location "B" the positions of 20 clerical employees were similarly surveyed. Within a year the clerical force had been reduced by six people, with a direct labor clerical cost saving of approximately $14,000. At location "C" the positions of 19 clerical employees were surveyed and, at the end of approximately one year, the work force had been reduced by 7 people with direct clerical labor cost savings of approximately $12,000. At location "D" the positions of 18 clerical workers were surveyed. At the end of 14 months the work force had been reduced by five people with resulting savings in direct labor clerical cost of approximately $11,000.

For details about the technique of developing standards see "Setting Standards on Office Work" by Paul R. Mulligan, Page 111, PROCEEDINGS of SAM's FIFTH ANNUAL TIME STUDY CONFERENCE (April 1950).

These are tangible continuing savings and to them must be added the intangible benefits that inevitably accrue through providing people with balanced jobs and making it possible for them to enjoy feelings of security, job satisfaction, and recognition. At this point, because it is important, I should like to mention a few of the things that made the introduction of clerical work measurement and clerical cost control acceptable to clerical employees and to clerical supervisors:

(1) Top management stated as a definite policy:
  (a) Existence of excess time in the initial application of the technique of clerical work measurement was not in any sense a reflection on local supervision for, until top management provided an adequate measurement device, the supervisor was without a yardstick to determine accurately the number of man-hours required to perform the work for which he was held responsible.
  (b) No competent employee would lose his or her position as an immediate result of the application of the technique of clerical work measurement.
  (c) Any reduction of personnel required to bring the over-all performance up to the accepted minimum standard of 87.5 per cent would be accomplished through normal transfers, turnover, etc.

(2) Because of the foregoing policy, clerical employees entered enthusiastically into the clerical work measurement part of the program.

(3) Every standard unit time developed had to be acceptable to the employee who performed the operation, to the supervisor, and to the analyst. Occasionally this policy resulted in prolonging the survey work somewhat, but it definitely paid off in good employee morale and interest in the objectives.

We are now in the process of applying the broad basic training part of our program to locations where clerical cost control is in effect. What the results will be when these locations have completed the program we can only speculate, but on the basis of evaluated results, so far creditable to each part of the program, we are inclined toward a feeling of optimism.

Impact of Taxation on Production and Jobs

By CLIFFORD F. HOOD
President, Carnegie-Illinois Steel Corporation

Are we developing "blind spots" about taxes? What can be done to develop a reasonable balance between government spending and the levying of taxes?

THE KOREAN WAR has restored the "emergency atmosphere," which always sidetracks sound economics and financing. The slogan then becomes "production at any price for defense." Emergencies tend to breed extravagance and wasteful practices all along the line in government functions, and also have their reflections in other segments of our economy.

The principles to be discussed are not new but are in great need of emphasis and re-emphasis. From the long-range point of view, they are nonetheless sound even though they will be given scant attention during the emergency period, and even though their soundness may be temporarily obscured by the change in philosophy that is developing during the present international crisis.

Twenty years ago tax expense was an item of minor importance on the operating statement or income account. Today it has assumed a status of major importance and has become one of the principal elements of cost. A business, to be healthy financially, must recover in its sales price all of the elements of the cost of its product plus a reasonable return on its investment, and at all times and under varying conditions, must recover sufficient funds for the replacement of its plant and equipment. If you concede that such a proposal is sound and reasonable, it then becomes clear that the income tax should be added to the other elements of costs before the sales price of an article can be established. This assumes, of course, that profits after taxes are limited to the minimum essential levels by competition. No concern can stay in business with continuing net losses. It is true that it could avoid income taxes by never having a profit, but it would eventually have its affairs wound up in the bankruptcy court.

The foregoing applies only to times when business is transacted on a somewhat normal basis. The plain, simple truth is that for the duration of the present international crisis, with the necessary preparation for defense and maybe for participation in an eventual major war, scant attention will be paid to the sound principles which must govern in normal competitive times. There is talk of imposing on corporations a severe excess profits tax, and for individuals and the transactions in which they engage, tax rates which will be almost confiscatory.

Adapted from a paper presented at the Forty-Third Annual Conference of the National Tax Association

EMERGENCY AND EXTRAVAGANCE

Due to our patriotism, such taxes will, for the duration of the emergency, be borne by most of us without grumbling, and I might as well be frank and acknowledge that for that period they will have practically no "impact on production or jobs." We shall probably again witness a struggle for production at any price similar to the conditions which prevailed during World War II. Once again extravagance and wasteful habits will be formed both in government and in industry which will be most difficult to correct at the termination of the emergency period. Of necessity those taxes must be removed immediately after the conclusion of the war unless we choose to follow the path heretofore taken by some other countries, notably England, where taxes at present consume approximately 40 per cent of the national income. A great many of us hope that this country will not choose such a path, and it is well to note here and now that presently taxes in the United States are eating up approximately 24 per cent of the national income.

In the field of local taxes, which admittedly always have been part of the operating costs, staggering increases have occurred in recent years. When seeking the reasons for those increases, I felt obliged to go out to the grass roots, so to speak, and started by visiting the various communities in which our plants are located. I was rudely awakened to find that there exists an almost complete indifference to the subject on the part of most people. To cite an example—in one community we found a businessman who was a property owner and had a large family. He has taken an active part in the political and educational life in his own community for many years. He typifies, we believe, the kind of leadership that has helped forge the moral and business standards of that district. Yet this man, who has contributed so much to the community-industry team over the years, disclosed a surprising "blind spot" on the subject of taxes.

TAXES AND COMPETITION

When told that the assessed valuation of Carnegie-Illinois property in that particular district went up 25 per cent in 1949 while all other property in the district was increased only five per cent, he did not seem interested or surprised. He may have thought, as many others

do, that the mill could absorb the increase with no difficulty, but the fact is that any increase in mill taxes directly affects production costs and thereby the position of that mill in a highly competitive industry. In the economic thinking of too many people, we fear, is the idea that the mill has virtually unlimited capacity for paying taxes and other costs.

Nothing could be further from the truth. In normal times the products of that mill must be sold in competition with other mills; and a mill located in a community which imposes low taxes has a distinct advantage over one located in a high tax area. All of us in business may be somewhat to blame for this widespread public ignorance of taxes and what they mean in the high competitive markets in which we all operate. This is a subject that should be on the public relations agenda of every businessman. The part that taxes play in the cost of our products should be more clearly explained to the public. Carnegie-Illinois is not unmindful of everyone's responsibility to pay his fair share of the cost of local government, but none should be required to pay more than his fair share. In many instances, I fear, such has not been the case. From a long-range point of view, our primary duty is to keep operating costs at our plants as low as possible. This is an obligation in each of our communities. Unless we remain competitive, we cannot provide the economic stability expected by our employes in the communities in which we operate.

The first step in an attempt to cure an ailment is to locate its cause. One need not search far to find the cause of taxes. They are the "price of government." The burden of taxation is really the burden of government spending. Waste in government causes excessive taxation. Our Federal and State governments are spending at a rising rate, now approximately $60 billions. They employ seven million persons and are raising in taxes some $56 billions. Our governments also have a total gross debt of approximately $275 billions.

It has been estimated that government budgets will soon rise to a total of $75 billions in view of the war situation and mounting domestic expenditures. This tax burden is no longer borne by a small segment of the population; it is borne by everybody. As government demands for funds rise, it is inevitable that the lower income groups will supply an increasing share of them. This means that the free income of wage earners and salary workers will constantly shrink, as it has already done by reason of payroll and income taxes. It has been shrunk and will be further shrunk by increased cost of purchases of merchandise caused by the heavy load of taxes which must be passed on to consumers by the producers of that merchandise.

PURCHASING POWER AND INVESTMENTS

This shrinking of the free income of the wage earners and salaried workers will result in an increasing shrinkage in the purchasing power of those individuals and a very material reduction of savings which could be used for investment in business enterprises; thereby acting as a double-edged sword cutting both ways in the vicious circle by eliminating the possibility of new jobs as well as curtailing production on the then existing jobs. With the return of business to a normal basis, lower taxes will be sorely needed. This will help place more free income in the hands of the workers. This free income will increase purchasing power for the then available output and make savings possible for investment in new enterprise. In turn, job opportunities and manufacturing economies will result. These economies will be passed along to the consumer in the form of lower prices, eventually putting the country on a more sound financial basis.

Many people, including a number of prominent economists, believe that the greatest and most vicious impact of taxes on production and jobs results from the present Federal Tax policy which has almost completely dried up the sources of risk or venture capital. Under the present system of Federal taxation, corporate earnings are taxed at 38 per cent and those same earnings when paid out to the stockholders in the form of dividends are again taxed at rates from 20 to 77 per cent depending upon the amount of other income of the individual. Therefore, people with savings available for investment are prone to seek exempt government bonds at low interest rates in preference to the common stocks of even the most attractive enterprises. A recent study by the staff of *McGraw-Hill Book Company* shows that periods of prosperity are almost exactly coincidental to periods of large capital investment by the heavy industries. It is estimated that those industries employ approximately one-third of the country's labor force and without that one-third being fully employed, prosperity is practically an impossibility. The present Federal tax policies and the inflated costs make it impossible for the heavy industries to retain earnings in sufficient volume to continue to finance necessary or desirable construction or even to replace equipment as it becomes obsolete. As stated before, the Federal tax policies almost completely discourage investors from taking new issues of common stocks which, combined with retained earnings, formed in years gone by the principal source of funds and capital investment.

It is the duty of everyone of us to do his utmost to acquaint the ordinary man and woman with the serious consequences which flow from excessive taxation. People are prone to demand almost unlimited services from their government without giving the slightest attention to the fact that ultimately they themselves pay the cost of government. Every individual in every community should be urged to acquaint himself with the reason for and the advisability of every item appearing in the budget adopted by the various governing bodies in his community each year. If a proper start can be made in the local communities, you may rest assured that the idea will spread up through the upper levels of the governments and will soon make itself felt within the Federal government, where the greatest possibility for economy exists.

TOWARD REASONABLE BALANCE

Bring home to the "man on the street" the fact that GOVERNMENT produces NOTHING. Its entire revenue is secured through its power to levy taxes. Government should be the servant of the people and not their master. Therefore, direct the individual's influence through channels of elected representatives to hold in reasonable balance the expenditures of public funds as well as the levying of taxes to meet those expenditures. Work more closely with the taxing authorities. Frank consideration and discussion can,

It is believed, form the basis for a more equitable tax distribution through better understanding of each other's problems. Tax assessing bodies have their pro-rata share of difficulties also.

In conclusion, may I submit these points:

1. All taxes are paid by the people.
2. All government expenditures ultimately are met by taxes.
3. Taxes levied on business affect production costs and thereby competitive position.
4. The indifference of the American public toward the serious consequences which will flow from excessive taxation is appalling.
5. It behooves each of us to embark upon a campaign of educating the American public as to the consequences of government spending and the resulting taxation.
6. The costs of government and our taxes are going to be increased tremendously because of the serious international situation.
7. The spending programs of our governments and the taxes they impose should be wisely planned to minimize their interference with productive private investment, employment, and consumption.
8. Our tax program should be developed toward curbing war and postwar inflation, to winning not only the battle of war financing but also the postwar battle against financial and economic instability and stagnation.
9. Tax policy must be altered so as to restore incentive for risk-taking investment.
10. And finally, if we are to preserve any reasonable purchasing power in the American dollar, the government must cease deficit financing; the war effort must be put on a pay-as-you-go basis; waste and extravagance must be eliminated; the vicious spiral of increasing wages and increasing prices must be stopped; each of us must roll up his sleeves, take up another notch in his belt and with all his strength "put his shoulder to the wheel" in concerted action to avoid an inflation spiral which could develop into disastrous proportions.

Management Books

Recently Received

Strategy in Poker, Business and War, by JOHN MCDONALD, 128 pages, New York City, Norton, $2.50.

Communication Within Industry, by RAYMOND W. PETERS, 198 pages, New York City, Harper & Brothers, $3.00

Mass Communications Research, by the Research Division, School of Journalism of the University of Minnesota sponsored by the OFFICE OF NAVAL RESEARCH, 56 pages.

Social Pressures in Informal Groups, by LEON FESTINGER, STANLEY SCHACHTER, AND KURT BACK, 240 pages, New York City, Harper and Brothers, $3.00

The Management of Personnel and Labor Relations, (2nd Edition), by GORDON S. WATKINS, PAUL A. DODD, WAYNE L. MCNAUGHTON, AND PAUL PRASOW, 974 pages, New York City, McGraw-Hill Book Company, $5.75

Small Plant Management, prepared under the auspices of the American Society of Mechanical Engineers, 499 pages, New York City, McGraw-Hill, $6.00

Leading and Managing Men, by DOUGLAS C. LYNCH, 166 pages, New York City, The Ronald Press Company, $3.00

The Dynamic Economy, a play, by HAROLD G. MOULTON, 238 pages, Washington, D.C., The Brookings Institution, $2.00

Suffolk's Guide to the Mails, Domestic Edition, by ROY L. PEPPERBURG, 78 pages, Greenlawn, New York, Suffolk Publications, $2.00

PAMPHLETS, ARTICLES AND REPORTS

Psychologists in Business — They assess the one indispensable item in the profit-and-loss equation: people. "Forbes Magazine of Business" (B. C. Forbes & Sons Publishing Co., 80 Fifth Avenue, New York 11), Aug. 1, 25 cents.

The Care and Feeding of Small Business — The second of two articles analyzing current changes in the relations between big and small business, by PETER F. DRUCKER, "Harper's" (Curtis Circulation Co., 521 Fifth Avenue, New York 17).

How to Raise Real Wages, by The Research and Policy Committee of the Committee for Economic Development, 43 pages, free upon request to Committee for Economic Development, 444 Madison Avenue, New York 22, New York.

Company Programs of Executive Development, by the National Industrial Conference Board, Inc., 66 pages, No. 107 in a series of Studies in Personnel Policy.

Kardex Visible Record Control, by Remington Rand, 80 pages, 315 Fourth Avenue, New York City, no charge.

The following are published by the Research Division, California Personnel Management Association, San Francisco, California:

An Engineer Looks at Demands on Costs and Production, by RALPH M. HEINTZ, 10 pages, $1.00;

The Management Job in Improving Employee Performance, by M. A. YOUNG, 10 pages, $1.00;

Profitable Management Faces A New Era, by W. WALTER WILLIAMS, 12 pages. $1.00;

What Profitable Management Means to the Worker, by WILLIAM GOMBERG, 13 pages, $1.00.

Time Study Research
Part IV
Allowances

By M. E. MUNDEL

Professor of Industrial Engineering,
Purdue University, Lafayette, Indiana

Completing the development of the secondary adjustment in rating time studies. Personal and machine time factors are presented for use.

THE THREE PRECEDING articles* dealt with procedures for obtaining a time that represents the time which would be taken by a standard type of operator using a standard rate of exertion on a job. Such a time as computed by the procedures given in these articles does not include three additional groups of adjustments which must commonly be made. These are:

1. Allowance for personal time
2. Allowance for irregular occurrences which may not have been time studied
3. Allowance for machine time

Each of these will be discussed separately. These allowances differ from the secondary adjustments (discussed in Parts Two and Three) in two respects; first they are usually applied similarly to every element in the task and second, they may, in some categories, actually represent a block of time which may be accumulated from a large number of cycles to eventually provide an interval in the work spell during which time the worker will not be working at his primary task, or during which he may not be working at all.

1. ALLOWANCE FOR PERSONAL TIME

It is not usual that a person can work through a normal industrial work spell without attending to personal needs. The amount of time required for these will be affected by the conditions surrounding the work; less in comfortable quiet surroundings and more when they are hot, dusty or noisy. Such an allowance is fairly well accepted in the literature although few quantitative studies seem to exist. The literature may be summed up as shown below and on page 24.

Such allowances are often quite reasonably subject to collective bargaining. However, if wage incentives are in use, care should be taken that negotiations for such allowances are not inadvertently confused with wage negotiations which are something quite different. These may easily be confused if the allowances are raised beyond the point of fulfilling their purpose and instead so increase the allowed time per unit as to permit considerably more earnings than would normally be possible. This is far beyond their conceived purpose.

In some plants, to replace most personal time, taken at will, rest pauses of various lengths are introduced into the work spell at definite intervals. An ap-

Author	*Date**	*Personal Allowance*
Lowry, Maynard and Stegemerten[2]	1927	10%
Barnes[3]	1937	2 to 4%
Holmes[4]	1938	3% ideal; 5% usual; up to 50%
Shumard[5]	1940	Included in rest factor of 8 to 20% for fatigue
Carroll[6]	1943	Relaxation allowance 5 to 40%
Schutt[7]	1943	No figures given in discussion
Alford and Bangs[8]	1944	3 to 5% (May be higher)
Myers[9]	1944	Varies with policy
Presgrave[10]	1944	2 to 4%
Gillespie[11]	1947	3 to 4%
Hendry[12]	1947	5%
Mundel[13]	1947	3 to 10%

*Date of first edition of book.

A schedule such as follows in Table 1 is recommended as typical.

TABLE 1
ALLOWANCE FOR PERSONAL TIME

Condition	*Reference Letter*†	*Per Cent*
Comfortable	S	3
Warm or slightly disagreeable	T	5
Hot, dusty, noisy, etc.	U	10
Special or unusual*	SP	As required

*In cases where extreme conditions are encountered, such as on certain steel mill tasks, job allowances as high as 66 per cent may be used.

†These reference letters continue on from those used for secondary adjustments so that the classification of allowances may also be recorded on the time study.

*Part I—June 1950, *Advanced Management*
Part II—August 1950, *Advanced Management*
Part III—Sept. 1950, *Advanced Management*

See page 24 for all references to Bibliography.

propriate amount of time will have to be introduced into each standard so as to proportion this time to all the jobs the worker may work on during the day.

For example, let us assume that the plant has two four-hour work spells separated by an unpaid lunch period. Let us further assume that a ten-minute rest pause is observed during both the morning and afternoon work spell. This is 20 minutes out of a 480 minute day or roughly 4.2 per cent. Consequently, all standards must have an adjustment added to them, in lieu of personal time perhaps, to allow the workers to accumulate 4.2 per cent of a day during the day and 4 or 5 per cent would be used.

2. ALLOWANCE FOR IRREGULAR OCCURRENCES

A rather unique method of determining and evaluating irregularly occurring elements is described in the literature as "ratio-delay" studies.*

3. ALLOWANCE FOR MACHINE TIME

If standards are set such that the typical operator may exceed standard by 30 per cent (or any other percentage depending on the incentive increment), some allowance will have to be added to jobs which are wholly or partially machine paced so that the standards on all jobs will permit similar production expectancy over standard.

This will facilitate the use of the standards in computing standard costs and the use of standards for scheduling, and; If incentives are in use, the incremental wage opportunity will be similar from job to job so as to maintain the actual job wage hierarchy as set forth in the base rate schedule.

On a job where the rate of production is entirely controlled by the machine this allowance is easy to compute. With the definition of standard suggested in the first article of this series, as most desirable, it would be 30 per cent. Two other types of jobs raise different problems:

1. Part of the cycle is machine controlled during which time the operator may rest.

2. Part of the cycle is machine controlled but the operator works during some part or all of this phase of the cycle.

One might anticipate that adding a thirty per cent incentive or production increment allowance to the machine controlled elements of the cycle would compensate properly for this, but shop data has shown that this is not so.[16] Because the operator is able to rest during part of the cycle he is actually able, on the worker controlled parts of the cycle, to work a good deal faster than the operator whose job is wholly man-work time. He may do this without exceeding the level of exertion of the 100 per cent manual operator.

That is the same as saying that allowing him to rest during part of the cycle permits him easily to exceed 30 per cent over standard on the remainder of the cycle without working harder (in total) than the person who works continuously at 130 per cent. Consequently, the allowance would be, in most cases, less than 30 per cent of the machine elements. Also, it is desirable to compute an allowance percentage for addition to all elements rather than merely the machine elements so that the allowance for this category may be handled as are the other allowances.

The data obtained from earning curves at the previously referred to plant where this factor was not taken into account indicates that the actual paces we may expect are as shown in Figure A.

Assuming the percentages of Figure A to be correct, a suitable allowance may be computed so that the possible production increment on all jobs will be 130 per cent of standard, as follows:

Let M = Per cent of base time of cycle controlled by the machine during which time the operator rests.

H = Per cent of base time of cycle controlled by the operator.

P = Possible pace for job as indicated in Figure A expressed as a fraction of 100 per cent pace.

A = Per cent allowance required to bring production possibility up to 130 per cent of standard.

Then H/P = Actual per cent of original base time of cycle that the hand time will actually take when performed at the pace made possible by the intermittent rest.

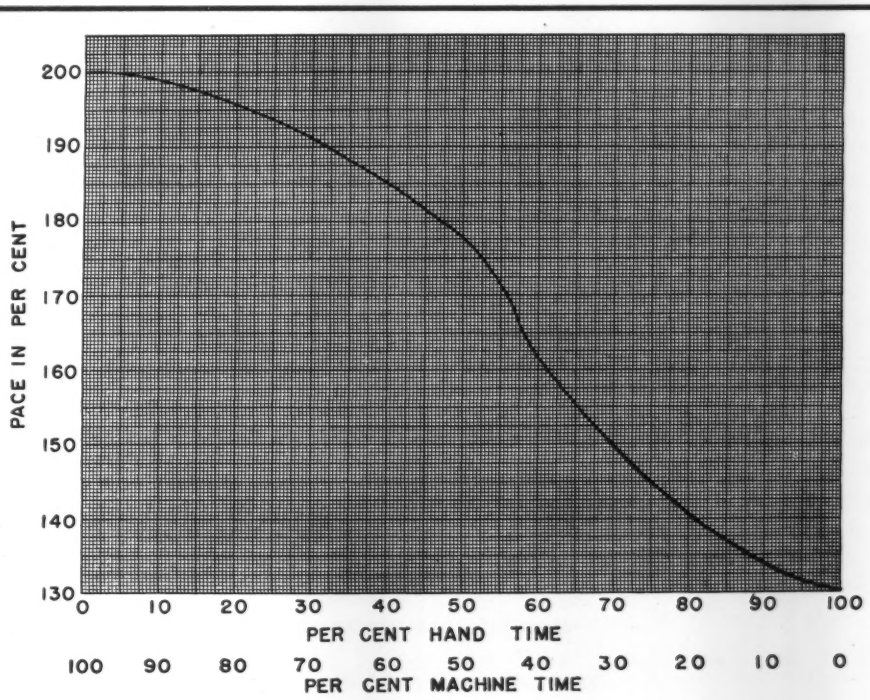


Figure A

*See *Advanced Management*," INDUSTRIAL APPLICATION OF THE RATIO-DELAY METHOD," *by R. M. Barnes and Donald S. Correll, Part I, August 1950 pg. 10; Part II, Sept. 1950, pg. 15.*

Also $\frac{M+H+A}{M+H/P} = 1.3$

and $A = 1.3\ (M+H/P) - (M+H)$

or $A = 1.3\ (M+H/P) - 100$

An allowance table computed in this fashion is given in Table 2.

TABLE 2

*MACHINE TIME ALLOWANCE**

Per Cent of Cycle Controlled by Machine	*Per Cent*
100	30
95	27
90	24
85	20
80	17
75	14
70	11
65	9
60	6
55	4
50	3
45 or less	0

For a reference letter use V followed by the per cent of the cycle which is machine controlled computed on the base time.

There is still another group of tasks which present a problem requiring further manipulation of these data. Let us assume we have a task of which 60 per cent is controlled by the machine. However, the operator prepares a load during part of this time and actually works 70 per cent of the cycle. From the table given previously, an operator with a cycle 70 per cent hand time would receive an 0 allowance; the inference is that he could go fast enough during the 70 per cent to exceed the standard by 30 per cent without an allowance.

However, in this case, his excess productivity during 40 per cent of the cycle would show up; how fast he went during the remainder of the hand time would not be of value since in this example the machine controls the production after the 40 per cent for hand time is completed.

Consequently, instead of gaining 30 per cent he would only gain 30 x 40/70 = 17 per cent. An allowance of 30 — 17 or 13 per cent would have to be added to bring this standard to a level he could exceed by 30 per cent without greater exertion than a 100 per cent manually paced operator. Note that this is larger than the 6 per cent allowance which would accompany a job of 60 per cent machine time during all of which the operator rested. Other situations may be evaluated in a similar manner.

SUMMARY—ALLOWANCES

Allowances are added to all elements equally. Either because of the nature of the allowance or the meagerness of data, as fits each case, some of the items in tables 1 & 2 may well be negotiated before being used.

Certainly, here are three additional areas meriting extensive additional research if we are to progress towards the final goal of reasonably reliable measurements on which to base industrial work standards.

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PROCEEDINGS OF THE ANNUAL CONFERENCE OF S.A.M.

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The Management Bookshelf

Public Administration by HERBERT A. SIMON, DONALD W. SMITHBURG, VICTOR A. THOMPSON. 582 pp. New York: Alfred A. Knopf. $6.00.

TWENTY-FIVE YEARS AGO *Mary Parker Follett,* distinguished political scientist and leader in the scientific management movement, brought out her thought-provoking new book *CREATIVE EXPERIENCE.* The first words of her introduction were "The social sciences are not gathering all the fruits of certain recent developments of thought; they are not all of them even using the most modern *method* of study, which is wholly to abandon the region of abstract speculation and to study the behavior of men. . . . The greatest need of today is a keen, analytical, objective study of human relations."

These words of a generation ago have a haunting and disquieting quality for present day students of administrative science. How far up the road have we really progressed in abandoning abstract speculation in favor of the objective study of the behavior of men in work situations? Specifically, what have the social sciences done for public administration since *Miss Follett's* investigations?

The book *PUBLIC ADMINISTRATION* by *Simon, Smithburg, and Thompson* is one answer. *Simon's* earlier book on *ADMINISTRATIVE BEHAVIOUR* (New York: The Macmillan Co., 1947) provided a critical analysis of some of the currently accepted principles of public administration. He and his two collaborators have now provided a greatly expanded examination of public administration in terms of the behavioristic concept, or as they state it, "the idea that the growth and decline of organizations is determined by an interplay between organization goals and the motives and interests of the individuals participating in them."

REALITIES OF ADMINISTRATION

This is a book for serious-minded students of administrative management. Designed primarily as a textbook for university teaching, it should also be of interest to all who are dealing with the administrative actualities of government.

The approach of the authors grows out of their collective experience in the practice of administration and in the teaching of this subject. Their purpose is to solve two instructional problems. They state that "the first problem is to make sure that what we teach about public administration accurately reflects what goes on in the real world of government—that it makes sense when applied to the actual experiences of administrators. The second problem is to convey these experiences to the reader in such a way as to give him concrete pictures of how people behave in governmental organizations, to enable him to visualize situations he has experienced only in a very limited way, if at all, and to prevent him from forming elaborate abstract verbalizations that he cannot translate into concrete patterns of behavior."

Emphasis is given: to the question of how the major governmental structures—Federal, State, and Local—should be organized or reorganized; to the "human aspect" of administration; and to the relationship between politics and administration. The authors begin their analysis in terms of individual human beings and small groups, and try to show "how the complexities of behavior in organizations can be unraveled and interpreted through the application of a few basic, almost common-sense, notions of psychology and sociology."

EMPIRICAL TESTS

Readers are encouraged to take a critical attitude toward the evidence which the authors submit to support their generalizations. They express the hope that their readers will join in the great task of "substituting fact for fancy in the theory of administration—of replacing ambiguity and proverblike wisdom with valid propositions that meet the tests of reason and experience." Where their evidence seems to them to be inadequate, the authors sometimes try to indicate what empirical studies are needed to test their propositions.

Students of scientific management will read the chapter on *Evaluating Administrative Efficiency* with special interest. This chapter is devoted to an examination of what people mean when they say one organization or procedure is better than another; in other words, devoted to a review of some of the criteria of efficiency and responsibility. The chapter concludes with a definition of effi-

(*Continued on Page* 28)

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SOCIETY NEWS

MANCHESTER CHAPTER received their charter at a special meeting on September 27. National President *Dillard E. Bird* presented the charter and spoke at the meeting. *C. S. Parsons* of the Chicopee Manufacturing Company is chairman of the Organization Committee. An active program has been outlined. *Dr. Erwin H. Schell*, of M.I.T. is scheduled to speak at the November meeting and *Dr. Alexander Magoun* will speak in December.

CINCINNATI CHAPTER is sponsoring the *Methods Improvement and Work Measurement Clinic* to be conducted by *Professor Ralph M. Barnes* at the Hotel Alms, in Cincinnati on November 16-17, 1950. A comprehensive program covering all phases of Time and Motion Study is outlined in a brochure available from *Clinton D. St. Clair*, Vice President, The Lunkenheimer Co., P. O. Box 360, Annex Station, Cincinnati 14, Ohio.

MILWAUKEE CHAPTER heard *Dr. Russel L. Moberly* on "Training Executives" at their October meeting. Dr. Moberly is Professor of Commerce at the University of Wisconsin, a national authority on the training of foremen, a widely known arbitrator and a vice-president and member of the board of the Milwaukee Chapter.

Programs for the balance of 1950 are: November 9, *"Bottom Up Management;"* December 14, *"Rights of the Worker."*

MONTREAL CHAPTER previewed the new *"Job Economics Training"* program developed by TWI at their September meeting.

CYBERNETICS AND MANAGEMENT is the topic to be covered by *Dr. Norbert Wiener* of M.I.T. in his talk before the November 16 meeting of the New York Chapter. He will deal with the practical application to typical daily management problems of this newest branch of scientific knowledge. *Dr. Alex Rathe*, New York University, will be Chairman of the meeting which will also present a panel of top executives for a discussion period. Meeting will be held at the Brass Rail, 5th Avenue and 43rd Street at 6:30 P.M. November 16, 1950.

Emerson Trophy Standings
Chapter Performance Award
As of September, 1950

CHAPTER	TOTAL
Washington	321
New York	293
Los Angeles	216
Milwaukee	192
Greensboro	183
Pittsburgh	155

THE INDUSTRIAL MANAGEMENT CONFERENCE presented by the *University of Missouri* is co-sponsored by local SAM chapters and several Missouri industrial groups. Scheduled for November 2-4, 1950, the program presents a host of well-known industrialists in a series of panels, addresses and seminars on subjects of current interest. *Dr. Robert C. Manhart*, professor of business management at the University is in charge of the program, for further information write: Industrial Management Conference 107 B & P A Bldg., Columbia, Missouri.

GEORGE N. COLLINS, Industrial Engineer, formerly General Works Manager of J. W. Beardsley's Sons, has joined *Wallace Clark & Co., Inc.*

PROBLEMS OF SENIORITY will be discussed in a conference at La Crosse, Wisconsin, on October 21, 1950. Sponsored by the University of Wisconsin Industrial Relations Center the program includes talks by four national authorities on the subject and an open forum discussion with the speakers sitting as a panel to answer questions from the floor.

NPA ADMINISTRATOR *William H. Harrison* has appointed the following officials to his staff: Executive Officer—*Oscar Neilson*, Director Office of Civilian Requirements—*Nelson Miller*, Director Office of Small Business—*James L. Kelly*, Assistant Administrator for Industry Operations—*Horace B. McCoy*, Special Assistant to the Administrator—*H. George Wilde*.

BRYANT COLLEGE OF BUSINESS ADMINISTRATION will present the *First Annual Business Management Institute* in Providence, Rhode Island on October 27th. *Professor Harrison D. Myrick*, head of the Department of Marketing at Bryant College is the Director of this Management Institute. SAM and several local industrial and professional associations cooperated in sponsoring this new activity. *Dr. Alfred C. Neal*, of the Federal Reserve Bank of Boston and *John L. Cohill*, Assistant to the President of the Firestone Tire and Rubber Co., are two of the featured speakers. *Dr. Henry L. Jacobs*, president of Bryant College will preside at the banquet.

NEW HAVEN CHAPTER heard *Herbert A. Lynch, Jr.*, speak on *"Rating of Time Studies"* at their September meeting.

NEW YORK CHAPTER'S October 5 meeting was highlighted by the "Inside Story of NLRB" presented by *Robert N. Denham* former General Counsel of the Board. Program was arranged by *James J. Bambrick, Jr.*, in charge of N. Y. chapter personnel activities, and *Carl Heyel*, president of the chapter.

W. C. ("CLEM") ZINCK, Plant Manager of Arbogast & Bastian, Inc., Allentown, Pa., and a member of the Philadelphia chapter, will present a paper on *"Maintenance Problems of the Small Plant"* at the *Plant Maintenance Show* in Cleveland, January 15-18, 1951. Other papers that might be of interest to SAM members are: "Incentive Payment of Maintenance Workers" by *G. E. Meyers*, Manager, Special Service, Eastern District, Ernst & Ernst, and *"Maintenance Costs, Their Control and Budgeting"* by H. E. Shaw, Industrial Engineer, Westinghouse Electric Corp., Pittsburgh, Pa. For a full list of conference speakers and subjects write to *James H. Eddy*, SAM Director of Industrial Engineering, c/o Yale and Towne Mfg. Co., Stamford, Conn.

GEORGE BASTIANELLO has been appointed as assistant sales manager of the Business Services Departments of *Remington Rand, Inc.* He specializes in management methods and service operations.

DANIEL B. ALTMAN has been appointed by the *Kuljian Corp.*, to head its new department of *Management Engineering*. He was formerly with Day & Zimmerman and Hare, Bready & Co.

ROBERT T. RAMSEY, JR., has joined *George H. Elliott & Co.* He will be in charge of their new Indianapolis office.

Industrial Relations Roundup

Businessmen can Influence Economics. Sumner H. Slichter, noted Harvard professor of economics recently told a School of Banking group at the University of Wisconsin that: ***"One of the most important immediate contributions that business can make to American life is to develop a practical program by which the net national product can be raised by almost $15 billion a year above the normal increase. This increase would be sufficient to meet the increased outlay on defense and on foreign aid."***

He explained that since 1929 the influence of businessmen on economic policy has suffered a sharp decline. In order to increase their influence upon public policy, businessmen need to produce their share of great thinkers. Businessmen will not contribute their share to guiding the course of history unless business produces thinkers whose ideas are able to win out in the stiff competition of intellectual life, Slichter advised.

"Important thinking is likely to bear elements of non-conformity. Consequently, the business world cannot develop important thinkers unless businessmen themselves are willing to stand behind men who show great capacity for originality and imaginativeness in their attack upon important problems.

"The work of men like Paul Hoffman, Ralph Flanders, Beardsley Ruml, and Marion Folsom shows that it is not unreasonable to expect business to develop men who are great thinkers as well as highly competent administrators," Slichter concluded.

How To Make Wage Surveys. A new report, "*Technical Note on Occupational Wage Surveys,*" has been issued by the *U. S. Dept. of Labor's Bureau of Labor Statistics.* It describes techniques of collecting and tabulating occupational wage rate data. Copies may be obtained free from the New York Regional Office, 341 Ninth Avenue, N. Y. 1, N. Y. Also available is a catalogue of wage studies by industry and area in the Middle Atlantic region.

Allen W. Walz has been appointed Industrial Relations Manager by the *Arma Corporation,* Brooklyn, New York.

Cartoons and Coasters in Annual Report. ATF, a pioneer in the use of interest-getting devices, uses a 24-page cartoon style annual report and a set of coasters to tell its employees about operations during the fiscal year ended March 1950. In past years they distributed phonograph records and jigsaw cut-outs to demonstrate the economics of business.

The 1950 story was emphasized in a series of pie-charts printed in two colors on a set of iced beverage coasters.

"Putting the economic story of business on a useful household article serves two purposes," *Thomas Roy Jones,* ATF Incorporated's president, said. "First, the pie-chart breakdown of the company's income dollar impresses upon the employe the fact that he receives a fair share of the income dollar. Next, it is designed to stimulate discussion of the economics of business as a conversational topic in the employe's home. For instance, in order to answer questions stimulated by appearance of the coasters, the employe must be familiar with the facts and figures about his company contained in the special report we prepare for him.

"American industry can be proud of the story of fairness and progress it has to tell, but it can't be told in the language of professional accountants and financiers."

Labor Relations and Personnel Administration are two new specialized courses being offered for the 1950 Fall term at the *Evening and Extension Division, City College,* Midtown Business Center, 430 West 50th Street, New York 19, New York.

Industrial and Traffic Safety— New evening courses leading to certificates in Industrial or Traffic Safety are offered by the *Center for Safety Education,* Division of General Education, New York University, 8 Fifth Avenue, New York 11.

Labor-Management Cooperation for Safety, a report of the principles accepted by the *President's Conference on Industrial Safety* is available from the U. S. Dept. of Labor, Washington, D. C. Chairman of the Committee on Labor-Management Cooperation for Safety is *Harold C. Zulauf,* Vice President, Alexander Smith and Sons Carpet Co.

Midyear Economic Report of the President, including, the report of the *Council of Economic Advisers* and a summary of economic developments in the first half of 1950, is available at 40 cents per copy from the Publications Section, U. S. Dept. of Commerce, New York Regional Office, 42 Broadway, N. Y. 4, N. Y.

"Insured Pension and Welfare Plans" by Robert E. Larson is a 129-page discussion of how companies can provide group security plans for employees and methods by which intelligent policies can be drawn up. It covers life insurance, pension and annuity plans, casualty insurance, and the costs and efficient administration of such plans. Copies cost $1.10 from the *Bureau of Business Research and Service* at the University of Wisconsin in Madison.

A. C. Croft, President, *National Foremen's Institute,* told the Annual Convention of the Association of Iron and Steel Engineers that ". . . the foreman and the supervisor are industry's most important production factor. The content of supervisory development programs should be determined by what the foremen themselves want to know and to learn. It is the self-generated interest to learn, not outside compulsion or persuasion, which guarantees self-improvement. This method (motivation from within) effectively destroys the isolation in which foremen usually find themselves. It makes them a functioning part of management."

Industrial Hygiene Foundation announces a 50-page bulletin containing material presented at the Foundation's Annual Meeting. It summarizes legislative developments in workmen's compensation, state codes, air pollution regulations and trends in health and sickness disability benefits. Copies are available at $.75 each to members. Write IHF at 4400 Fifth Avenue, Pittsburgh 13, Pa.